EXD.

VOL. 85. Part 20.* Pp. 467–503. 15th December, 1936.

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TRANSACTIONS

OF THE

ROYAL ENTOMOLOGICAL SOCIETY

OF

LONDON

Studies on African Odonata, with synonymy and descriptions of new species and subspecies. By CYNTHIA LONGFIELD . pp. 467–498

LONDON:
PUBLISHED BY THE SOCIETY AND
SOLD AT ITS ROOMS, 41, QUEEN'S GATE, S.W. 7

[*Price 7s. 6d.*]

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STUDIES ON AFRICAN ODONATA, WITH SYNONYMY AND DESCRIPTIONS OF NEW SPECIES AND SUBSPECIES

By Cynthia Longfield.

[Read 3rd June, 1936].

With Ten Text-figures.

The material for this paper is derived from all parts of the African continent other than the Mediterranean region. The studies are based on six collections recently made, as well as many specimens sent by correspondents of the Imperial Institute of Entomology. In addition, I have examined several hundred specimens in the British Museum collection. My thanks are due to Dr. H. Schouteden for so kindly sending on request material from Belgium, to Dr. Erich Schmidt for a drawing of a type specimen in the Berlin Museum and a proof of the posthumous paper by Dr. Ris on the African species of *Pseudagrion*. Dr. Jeannel of the Paris Museum also kindly gave me the opportunity of naming the collection of Odonata made by La Mission Scientifique de L'Omo, the results of which are to be published elsewhere. I am also indebted to Dr. Karl Jordan, F.R.S., and Mr. W. H. T. Tams for collecting dragonflies during their expeditions to Africa, and to Mr. D. E. Kimmins for the drawings that accompany this paper. My own collecting expedition enabled me to make many notes of the colours of the living specimens at the time of capture.

PART I

Zygoptera.

Agriidae.

Chlorocypha Fraser, 1928.

Libellago Selys, 1853, *Bull. Acad. Belg.* **20** Annexe (Syn. Cal.): 57 (preoccupied by *Libellago* Selys, 1840). Genotype: *Agrion dispar* Beauvois, 1809.
Chlorocypha Fraser, 1928, *J. Bombay nat. Hist. Soc.* **32**: 684.

Chlorocypha has now been established as the name of the African genus of Selys' "Légion Libellago." Not only has confusion been caused by the wrong application of the generic name *Libellago*, but an equal confusion has been caused by Karsch applying the specific name of *curta* to the wrong insect. Dr. H. Schouteden first pointed out this error in 1934.*

Chlorocypha curta Hagen.

Libellago curta Hagen, 1853, *in* Selys, *Bull. Acad. Belg.* **20** Annexe (Syn. Cal.): 58. Selys, 1854, *Mém. Soc. Sci. Liége.* **9**: 229.
Libellago decorata Karsch, 1893, *Berlin ent. Z.* **38**: 34. Karsch, 1899, *Ent. Nachr.* **25**: 165.

Libellago decorata Karsch is identical with *Libellago curta* Hagen, 1853, as acknowledged by Karsch himself in 1899, and it should retain the prior name of *curta*.

Chlorocypha curta has the first six segments of the abdomen red, and the last four blue. The thoracic and abdominal patterns are shown by Karsch, 1893, figs. 1, 3 and 3*a*.

* Schouteden, 1934, *Ann. Mus. Congo belge*, (3) **3** (Odonates **1**): 75.

Chlorocypha selysi Karsch.

Libellago curta Selys, 1879, *Bull. Acad. Belg.* (2) **47** : 382. Karsch, 1893, *Berlin ent. Z.* **38** : 35. Karsch, 1899, *Ent. Nachr.* **25** : 165.

Libellago curta Selys, 1879, should receive the name of *selysi* as suggested by Karsch in 1899. This species has the entire abdomen red. The thoracic and abdominal patterns are shown by Karsch, 1893, figs. 1, 5 and 5*a*.

Chlorocypha tenuis sp.n.

♂. Abdomen, 22 mm. Hind-wing, 22 mm. *Head*: Mandibles and base of labium golden-brown, median and lateral lobes black. Labrum and anteclypeus shiny mahogany-brown shading to black at the sides; genae the same. Postclypeus, frons, vertex and epicranium deep velvety black covered with short black hairs and marked with pale green as follows: three ill-defined spots on postclypeus, two round spots on frons, a triangular patch either side of the ocelli, the occipital plate and a round spot at each end of it. Rear of head black. *Prothorax*: Velvety black broadly circled with pale green and with four small green spots on median lobe. *Synthorax*: Dorsally velvety black with the following green markings: dorsal carina; a hammer-shaped antehumeral mark, the narrow "handle" not touching a large spot near antealar sinus; between spot and head of "hammer" an elongated mark on humeral suture. Laterally mostly green, the black extending irregularly along the 1st lateral suture and enclosing a green spot beneath the fore-wing. There is an isolated black spot on 2nd lateral suture beneath the hind-wing and the lower edge of the metepimerum is also black. Beneath green marked black, coxae the same. Yellow points between the wings (fig. 1). *Leg*: Black, a green stripe on inner side of tibia. *Abdomen*: Scarlet. Sides of 1–4 segments green, starting broadly and tapering away on 4th. Beneath shiny black. Dorsum of 1st segment mostly black, the green almost meeting across posterior end. Each joint has a narrow black ring, and 2–6 segments a tiny black fleck on either side of the dorsal carina just before posterior end. Anal appendages black (fig. 1). *Wing*: Hyaline tinged with chrome-yellow to distal end of quadrilateral and as far as nodus between costa and radius. *Pt.* black. *Arc* at or just distal to 3rd antenodal. Petioled to or just distal to 2nd antenodal. *Antenodals* $\frac{8 \mid 9}{9 \mid 11}$, *Postnodals* $\frac{15 \mid 16}{14 \mid 13}$.

♀. Abdomen, 18 mm. Hind-wing, 25 mm. *Head*: Labium, labrum, genae, mandibles and anteclypeus shiny yellow-brown, only the tips of mandibles black. Ground-colour of head, prothorax and synthorax velvety black as in the male, but with more pale markings as follows: the entire centre of the postclypeus as well as a lateral spot, first joint of antenna and two wedge-shaped marks on frons, ocelli almost encircled and an extension upwards from gena along edge of eye, occipital plate and postocular spots fused. *Prothorax*: Anterior lobe entirely yellow, and a yellow stripe down centre of posterior lobe in addition to the entire yellow border and four spots on median lobe. *Synthorax*: Pale markings dorsally yellow and not hammer-shaped, also very much increased in area (fig. 1). *Leg*: Some yellow at base of femur but none on tibia. *Abdomen*: black and yellow-brown as in fig. 1. Underside black. *Wing*: As in male, but tinged with yellow along entire costa to *Pt.* which is dark brown. *Arc* at or basal to 3rd antenodal. Petioled to or just basal to 2nd antenodal. *Antenodals* $\frac{9 \mid 10}{9 \mid 9}$. *Postnodals* $\frac{14 \mid 16}{14 \mid 12}$.

Holotype ♂, 2.iii.1934; Allotype ♀, 26.ii.1934 and paratypes ii.–iii. 1934. UGANDA: Kibale Forest, Toro District (*C. E. Longfield*). In British Museum.

Some of the male paratypes have the tips and the lower edges of the wings faintly tinged with brown. Some have the green spots on the labrum and postclypeus obscured, and the green very much reduced on the prothorax. Three of the female paratypes are very mature specimens and are so pruinose as to almost obscure all yellow markings except on the abdomens, the general colour appearing blue-black. One is so teneral that the top of head has hardly any black, and the *Pt.* is pale yellow surrounded by light brown. The nodal

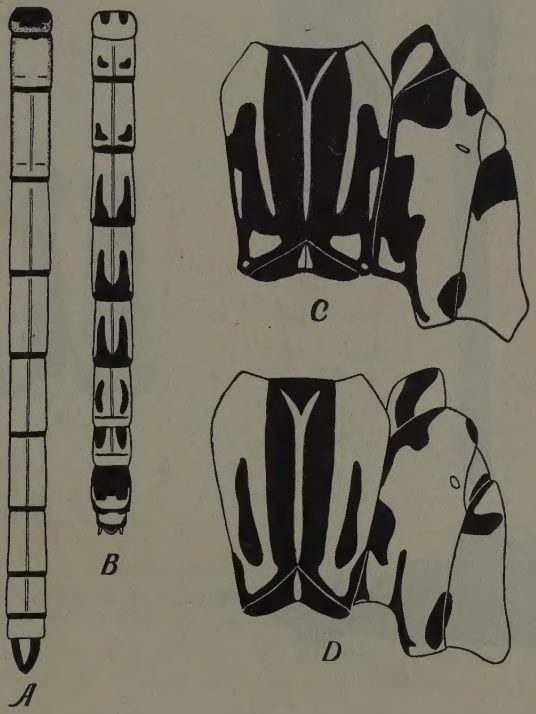

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Fig. 1.—*Chlorocypha tenuis* sp. n. *a.* ♂ abdomen. *b.* ♀ abdomen. *c.* ♂ synthorax. *d.* ♀ synthorax.

index is variable in both sexes. Length of abdomen: ♂♂ 21·5–23 mm., ♀♀ 18–19 mm. Hind-wing: ♂♂ 22–24 mm., ♀♀ 25 mm.

This extremely handsome *Chlorocypha* most nearly resembles *Ch. dispar* Beauvois,* but is a very much more slender insect. It also has less black on the first abdominal segments, besides being pale on the sides of the first four, which are black in *dispar*. Both sexes frequent damp forest in the thickest and darkest places. Although in both sexes and in the entire series the pale colour-

* Palisot de Beauvois, 1805, *Ins. Afr. Amer.* : 85.

ing is a clear yellow in the dead insects, these pale areas were a pure green in the males while alive.

Coenagriidae.

Chlorocnemis Selys, 1863.

Chlorocnemis Selys, 1863, *Bull. Acad. Belg.* (2) **16**: 175. Genotype: *Chlorocnemis elongata* Hagen, 1863.

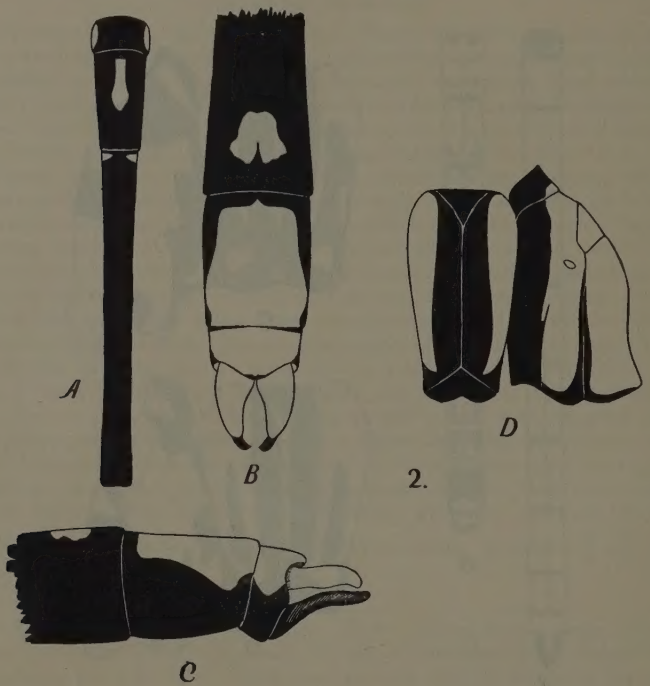

Fig. 2.—*Chlorocnemis pauli* sp. n. *a*. 1–3 segments of type ♂ abdomen. *b*. 8–10 segments of ♂ abdomen. *c*. The same from the side. *d*. ♂ synthorax.

Chlorocnemis pauli sp. n.

♂. Abdomen, 37·5 mm. Hind-wing, 23 mm. *Head*: Black. Base of labium and mandibles yellow. A broad sky-blue band across frons between clypeus and base of antennae, this band continuing on either side across the front of the eyes. Two sky-blue spots on labrum. *Prothorax*: Black, sky-blue centre to anterior lobe and sides of median and posterior lobes. *Synthorax*: Black dorsally and reaching to 1st lateral suture, the sides sky-blue, beneath yellowish. A broad sky-blue antehumeral stripe as wide as the corresponding dorsal black, but narrowing posteriorly and curving inwards just before the antealar sinus, which it does not reach. Near the top of the 1st lateral suture the blue colour spreads on to the mesopleurum. The whole of the 2nd lateral suture is blackish-brown. Points between the wings sky-blue (fig. 2). *Leg*: Black with the following

sky-blue: coxa, trochanter, inside of femur and tibia. *Abdomen*: 1–8 segments black, with the following sky-blue markings: underneath and entire sides of 1st segment, sides of 2nd segment and small flask-shaped spot on dorsal surface, undersides of 3–5 segments and a narrow anterior ring almost meeting on dorsal surface. The three last segments are black beneath and dorsally bright orange as follows: a large spot at posterior end of 8, a square patch over entire dorsal surface of 9 not touching the anterior carina but spreading over the sides at posterior end, entire dorsal surface of 10 and spreading over the sides. Superior appendages orange, inferior black (fig. 2). *Wing*: Clear lemon-yellow. *Pt.* small, almost square and jet-black.

Holotype and paratype ♂♂, 2.iii.1934. UGANDA: Kibale Forest, Toro District (*C. E. Longfield*). In British Museum.

Some of the paratypes differ slightly in the size of the dorsal blue spot on 2nd abdominal segment and the blue rings on 3–5 segments. In some there is an absence of spots on the labrum. Abdomen, 37–37·5 mm. Hind-wing, 23 mm.

This fine insect resembles *Ch. marshalli* Ris * in general facies. It differs in the abdominal pattern, the colour of the anal appendages and in their shape. I have much pleasure in naming this species after Mr. Eric Paul of Buzirasagama, my host whilst collecting.

Mesocnemis Karsch, 1891.

Mesocnemis Karsch, 1891, *Ent. Nachr.* **17**: 66. Ris, 1921, *Ann. S. Afr. Mus.* **18**: 296. Genotype: *Mesocnemis singularis* Karsch, 1891.

The genus *Mesocnemis* Karsch is unique amongst COENAGRIIDAE in the position of the arculus. Karsch decided that it could not be identical with *Metacnemis* Hagen, 1863, as Selys did not mention the position of the arculus as being in any way abnormal.† Ris figures the wings of a ♀ of *Metacnemis valida* Hagen which is certainly not congeneric with *Mesocnemis* Karsch. As Dr. Ris must have known the genotype of *Metacnemis* and probably that of *Mesocnemis* also, there can be no doubt as to the validity of the two genera, although they so closely resemble each other in general facies.

Mesocnemis singularis Karsch.

Mesocnemis singularis Karsch, 1891, *Ent. Nachr.* **17**: 67.
Metacnemis pruinosa Fraser, 1928, *Trans. ent. Soc. Lond.* **76**: 129.

Fraser's holotype and allotype of *Metacnemis pruinosa* from Uganda (British Museum), are identical with Karsch's *Mesocnemis singularis*.

Ischnura Charpentier, 1840.

Ischnura Charpentier, 1840, *Libell. Eur.*: 20. Genotype: *Agrion elegans* Van der Linden, 1820.

Ischnura senegalensis Rambur.

Agrion senegalense Rambur, 1842, *Hist. nat. Ins., Neuropt.*: 276.

I took a sample series of this species from Lake Bunyoni, Kigezi Dist., Uganda, at 6500 ft., where it was simply swarming at the time of my visit in March, and where the bulk of the insects present were paired. It was most noticeable that the homochrome females were almost without exception paired, and that the orange heterochrome females were practically all single. I took four of the latter *in cop.* and saw only two more connected *per coll.* Out of

* Ris, 1921, *Ann. S. Afr. Mus.* **18**: 291.
† Selys, 1863, *Bull. Acad. Belg.* (2) **16**: 160.

hundreds of females, the normal form was twice as abundant as the heteromorphic form.

Mombagrion Sjöstedt, 1909.

Mombagrion Sjöstedt, 1909, *Kilimandjaro-Meru Exp.* **2** (Pseudoneurop. 14) : 44. Genotype : *Mombagrion gracile* Sjöstedt, 1909.

Mombagrion congoense Sjöstedt.

Mombagrion congoense Sjöstedt, 1917, *Ark. Zool.* **11** (14) : 14.

In my series of males from Uganda, four are the same as the type with the whole centre of the head black. The light colours of the living insects are as follows : sky-blue on the head, thorax, 1–2 and 7–9 abdominal segments ; eyes and undersides of other abdominal segments pale green ; legs and underside of thorax cream. One specimen is, however, obviously juvenile. There is far more blue than in the other four. Abdominal segments 4–6 and half 7th are dark grey. On the thorax the black marks are very faint, and on the head the black central patch is reduced to a few narrow lines surrounding an olive-green area.

Pseudagrion Selys, 1876.

Pseudagrion Selys, 1876, *Bull. Acad. Belg.* (2) **42** : 490. Ris, 1936, *Abh. Senckenb. naturf. Ges.* **433** : 1–68. Genotype : *Agrion furcigerum* Rambur, 1842.

Having taken good series of many species of the genus *Pseudagrion* in the field, I intend to make a few remarks on the colours of some of these insects when alive, as the colouring often differs so widely after death.

Pseudagrion bicoerulans Martin.

Pseudagrion bicoerulans Martin, 1906, *Bull. Mus. Hist. nat.*, Paris **12** : 511. Ris, 1936, *Abh. Senckenb. naturf. Ges.* **433** : 36.

This is the largest and stoutest insect of the whole genus, and with its calliper-shaped superior appendages in the male, is very distinctive. The ground-colour is black in both sexes and the colour pattern as in Martin's description, but the actual living colours are not, in many respects, as they appear to be after death. The blue colour of the 1–2, and 8–9 abdominal segments in the mature male, is whitish-pruinose giving a powder-blue effect. The antehumeral stripes are sky-blue and the sides of the thorax emerald-green. These colours fade to a uniform yellow after death. The clypeus and postocular spots are orange. The female is differently coloured, except for the emerald-green sides to the thorax. The labrum, clypeus, postocular spots, the 1st and 10th abdominal segments, as well as the broad antehumeral stripes are sky-blue.

Pseudagrion angolense Selys.

Pseudagrion angolense Selys, 1876, *Bull. Acad. Belg.* (2) **42** : 493. Ris, 1936, *Abh. Senckenb. naturf. Ges.* **433** : 39.

My series of *P. angolense* had the following colours during life. The Uganda males had the light colour on the face, also the postocular spots, orange. The antehumeral stripes, sides of the thorax and sides of 1–7 abdominal segments were grass-green. The dorsal surface of 8–10 segments was powder-blue (*i.e.* pruinose). The two males from the Congo taken more than a month later, had all the light parts thickly pruinose. The only female specimen in my series, was paired with one of the Uganda males. The side of the thorax were grass-green as in the male, but the light colours on the head, the antehumeral stripes

and the 9–10 abdominal segments were turquoise-blue. Length : Abd. 32 mm., Hw. 23·5 mm.

Pseudagrion epiphonematicum Karsch.

Pseudagrion epiphonematicum Karsch, 1891, *Ent. Nachr.* **17** : 68. Ris, 1936, *Abh. Senckenb. naturf. Ges.* **433** : 38.

In the case of the insects of this species that I collected, I noted at the time the following colours for the males : " light blue on the head and thorax, including the antehumeral stripes; powder-blue (*i.e.* pruinose) on the last segments." The female does not seem to have been described as yet. The two specimens I collected, were taken at the same time and in the same place as the males, in deep forest on the eastern foothills of the Ruwenzori Range. These females had all the light colour blue on the head, the thorax and the 9–10 abdominal segments. Legs mostly pale (yellow ?).

This species closely resembles *P. angolense* in the shape of the male appendages, but differs in the following particulars :—

P. epiphonematicum.	*P. angolense.*
Antehumeral stripes broad.	Antehumeral stripes very narrow.
Postocular spots without a pale line joining them together.	Postocular spots joined across the occiput by a pale line.
Postocular spots and pale colour on the head blue.	Postocular spots and pale colour on the head of the ♂ orange.
Wing tips rounded.	Wing tips rather pointed.
Pt. large and square.	*Pt.* small, obliquely oblong.

The horns on the female prothorax are entirely pale coloured as in *angolense*, but shorter, a little less than half the depth of the prothorax.

Pseudagrion nubicum Selys.

Pseudagrion nubicum Selys, 1876, *Bull. Acad. Belg.* (2) **42** : 501. Ris, 1936, *Abh. Senckenb. naturf. Ges.* **433** : 24.

My series of *P. nubicum* from the Congo, with many of the insects taken paired, are all longer in dimensions than those given by Selys and Ris for specimens taken farther north. Male and female abdomens measure from 25–26 mm. The colours during life were as follows : Adult males, sky-blue postocular spots, antehumeral stripes, 1st abdominal segment, dorsal patch on 2nd segment and 8–9 segments; grass-green on face, eyes and sides of thorax. Juvenile male, cream and very pale blue. Females, all light parts grass-green.

Pseudagrion glaucescens Selys.

Pseudagrion glaucescens Selys, 1876, *Bull. Acad. Belg.* (2) **42** : 498. Ris, 1936, *Abh. Senckenb. naturf. Ges.* **433** : 61.

Unfortunately, I also caught only males of this beautiful, slender insect, so the female still remains unknown. The males have the same brilliant mixture of green and blue when alive, as so many of the *Pseudagrion* species, but in this case rendered more brilliant by the black markings being so reduced.

Pseudagrion massaicum Sjöstedt.

Pseudagrion massaicum Sjöstedt, 1909, *Kilimandjaro-Meru Exp.* **2** (Pseudoneurop. 14) : 48. Ris, 1936, *Abh. Senckenb. naturf. Ges.* **433** : 50.

My series of males from Uganda were brilliant in colouring when alive. They had scarlet heads with copper-red vertex and postocular spots, and the

thorax was brilliant glossy crimson-red above, with sky-blue sides. The light colour on the 1–2 and 8–10 abdominal segments was sky-blue when not pruinose. The female colouring was somewhat different, the ground-colour being greenish-grey, not so yellow as olivaceous, while the sides of the thorax, dorsal surface of 9–10 abdominal segments and the postocular spots were pale blue. Several of these females were taken paired.

4 ♂♂ and 1 ♀ (*in cop.*). Belgian Congo : Lake Kivu, 17.iii.34, differed considerably in colouring during life, also the males are appreciably longer in the abdomen. The adult males had the light colour on the face, the eyes and the *Pt.* scarlet. The top of the thorax and the postocular spots were slate-grey, sides of thorax, 1st abdominal segment, round dorsal spot on 2nd, 8–9, sky-blue, while the rest of the abdomen was olive-green and black and the legs pruinose. The black markings on the head, thorax and abdomen are exactly similar in pattern, to the Uganda specimens. In one juvenile male the face was orange and black, the top of the thorax and basal half of abdomen olive-green and yellow, while the sides of the thorax were pale blue and the *Pt.* brown. The female was olive-green and black. Length : Abd. ♂ 30 mm. ♀ 28 mm., Hw. 21 mm.

The female resembles all the others of this species in every particular. The male differs very slightly in not showing the terminal hook of the superior appendage from the dorsal view. This hook is, however, present, but in all four Kivu males seems to be placed in a slightly different position. The terminal edge of the 10th segment is straighter, less deeply " cut up " than in either my Uganda specimens or Ris's drawing of the genitalia. Nevertheless, on such differences in the males only, I do not feel justified in naming a new species.

Enallagma Charpentier, 1840.

Enallagma Charpentier, 1840, *Libell. Eur.* : 21. Kennedy, 1920, *Ohio J. Sci.* **21** : 87. Ris, 1921, *Ann. S. Afr. Mus.* **18** : 317. Genotype : *Agrion cyathigerum* Charpentier, 1840.

It may ultimately be found desirable to separate the African species of *Enallagma* from the N. American, and some of Kennedy's names may be adopted, but in my opinion better characters will have to be found than those given by Kennedy. The 10th abdominal segment in the males, varies between a high projection and none at all, which makes the characters for the genus *Africallagma* Kennedy, 1920, quite inadequate. The same can be said for *Ischnallagma* Kennedy, 1920. *Enallagma subfurcatum* Selys and *E. rotundipenne* Ris might be divided off under the generic name of *Proischnura* Kennedy, 1920, on the unusual forked apex to the 10th abdominal segment, and possibly on the penis, but not on the third character. The different species of *Enallagma* show extreme variability in the positions of veins M_{1a} and M_2 in the wings; the size of the postocular spots and whether they are joined by a line or not; and also in the dimensions of the insects themselves. On the whole, until a great deal more study has been given to them, I agree with Dr. Ris in including them all in the same genus.

Enallagma elongatum Martin.

Ischnura elongata Martin, 1906, *Bull. Mus. Hist. nat. Paris*, **12** : 513 (Type ♀). Sjöstedt, 1909, *Kilimandjaro-Meru Exp.* **2** (Pseudoneurop. 14) : 42 (descr. ♂).

Dr. Ris has described and figured * the wrong male under the name of *E. elongatum* Martin (*see* next species). I have seen two males of *E. elongatum*

* Ris, 1921, *Ann. S. Afr. Mus.* **18** : 324.

Martin from Nairobi, now in the British Museum, and have no hesitation in naming them from the description by Sjöstedt.

Enallagma pseudelongatum sp. n.

Enallagma elongatum Ris, *nec* Martin, 1921, *Ann. S. Afr. Mus.* **18** : 325 (descr. and f. app. ♂).

The male has been accurately described by Ris under the name of *E. elongatum*, and only a comparison with that species is included here.

E. elongatum.	*E. pseudelongatum.*
Postclypeus sky-blue.	Postclypeus black.
1–2 joints antenna blue.	1st joint antenna blue.
Blue postocular spots fading into pale colour of rear of head.	Broad black line dividing blue postocular spots from rear of head.
Dorsal surface of prothorax mostly blue, with black sutures and two black wedge-shaped patches.	Dorsal surface of prothorax mostly black, with a small blue spot in centre, blue anterior lobe and blue laterally on posterior lobe.
Black humeral stripe narrow, tapering dorsally.	Black humeral stripe much broader, barely narrowing dorsally.
1st abdominal segment with black dorsal patch reaching almost to posterior carina.	1st abdominal segment with black dorsal patch only half-way to posterior carina.
2nd abdominal segment with black on dorsal surface vase-shaped, reaching from anterior carina to a narrow black ring at posterior carina (fig. 3).	2nd abdominal segment with black on dorsal surface a fairly narrow band, convex anteriorly, crossing the posterior half of segment and not reaching either carina, a narrow black ring on each (fig. 3).
Black very narrow on dorsum of 10th segment. Inferior anal appendages blue.	Dorsum of 10th segment broadly black. Both anal appendages black.
Legs very pale, only claws, spines and a narrow line on outer femora black.	Broad lines on femora and tibia as well as claws and spines black.
Venation pale brown or sandy.	Venation dark.
Anal appendages of male as in fig. 3.	Anal appendages of male as in fig. 3.

The female (four specimens were taken *in cop.*), has not been previously described. It closely resembles the male. The pattern on the abdomen is different and the pterostigma is larger. The pale colour of the thorax and postocular spots is sky-blue as in the male, in very mature females, but bright green in younger ones.

♀. Abdomen, 27 mm. Hind-wing, 20 mm. *Head*: Pale yellow with the following black: tips of mandibles, basal suture of labrum and outline of postclypeus, a speck in centre of frons, 3rd joint of antenna, vertex (with the exception of a triangular patch on either side of ocelli), and a surround to postocular spots. *Prothorax*: Only the sutures and two crescent-shaped marks on median lobe black. *Synthorax*: The black stripes slightly narrower than in the male, otherwise exactly following Ris' description (fig. 4). *Leg*: Less black than in male. *Abdomen*: Black on dorsum, green or blue on sides, this colour entirely encircling the posterior half of segment 1 and almost encircling the anterior ends of segments 3–7. Segments 8–10 and appendages blue with the following black: a broad dorsal band two-thirds the length of 8, and two small pointed patches reaching half-way the length of 9 (fig. 3). *Wing*: Venation ochreous. *Pt.* light red-brown. M_2 at sixth postnodal in fore-wing, at fifth in hind-wing. M_{1a} three veins distad.

Holotype and allotype taken *in cop.*, 8.iii.1934. UGANDA: Birunga Mts., Kigezi District (*C. E. Longfield*). In British Museum.

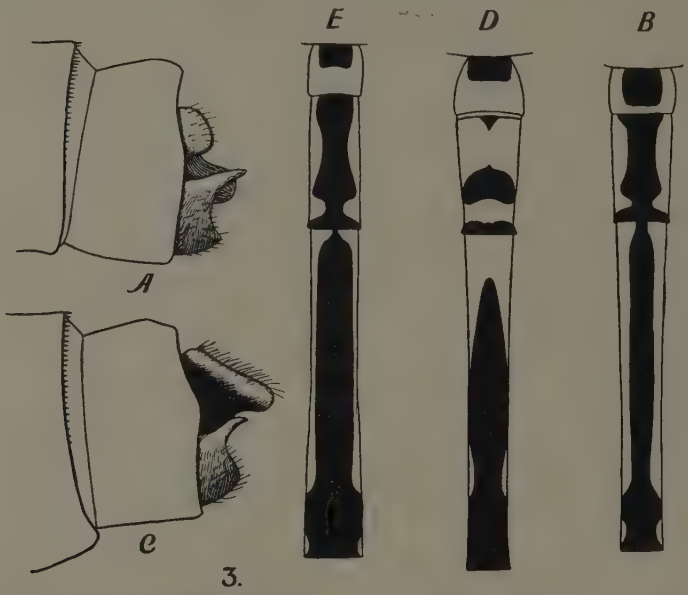

FIG. 3.—*Enallagma elongatum* Martin, *a.* anal appendages of ♂, *b.* 1–3 segments of ♂ abdomen. *Enallagma pseudelongatum* sp. n., *c.* anal appendages of type ♂, *d.* 1–3 segments of ♂ abdomen, *e.* 1–3 segments of allotype ♀ abdomen.

FIG. 4.—*Enallagma pseudelongatum* sp. n. Synthorax of allotype ♀.

Five male and one female paratypes were taken at the same time in the type locality, a small swamp of grass, rushes and *Kniphofia* sp. in the centre of bamboo forest at 7500 ft. Seven male and two female paratypes were taken

26. ii.1934 in the Kibale Forest, Toro District, Uganda. The position of vein M_2 varies from the fifth to seventh postnodal, and that of M_{1a} from two to four veins distad.

These two long-bodied species, *E. elongatum* and *E. pseudelongatum*, are found at higher altitudes in east and central Africa than almost any other dragonflies, as remarked by Sjöstedt and independently noted by myself.

Anisoptera.

Gomphidae.

Notogomphus Selys, 1857.

Notogomphus Selys, 1857, *Mon. Gomph.*: 119. Karsch, 1890, *Ent. Nachr.* **16** : 373. Selys, 1892, *Ann. Soc. ent. Belg.* **36** : 103. Ris, 1909, *Ber. Senckenb. naturf. Ges.* **40** : 24. Campion, 1923, *Ann. Mag. nat. Hist.* (9). **12** : 659. Genotype : *Gomphus ruppeli* Selys, 1857.

Podogomphus Karsch, 1890, *Ent. Nachr.* **16** : 374, 381. Selys, 1892, *Ann. Soc. ent. Belg.* **36** : 101. Sjöstedt, 1906, *Kilimandjaro-Meru Exp.* (Pseudoneuropt.) : 25. Campion, 1923, *Ann. Mag. nat. Hist.* (9). **12** : 660. Schouteden, 1934, *Ann. Mus. Congo belge* (3) **3** (Odonates **1**) : 62. Genotype : *Podogomphus spinosus* Karsch, 1890.

In Karsch's original description of the genus *Podogomphus* in 1890 he gave the following as generic characters : upper lip visible from above, hind femur reaching at least to the middle of the 2nd abdominal segment, with 3–5 very long spines on basal half. He included *Gomphus praetorius* Selys in the genus. Selys in 1892 gave as one of the definite characters of *Podogomphus* Karsch, the basal subcostal nervule in all four wings. Sjöstedt in 1906 described four new species of *Podogomphus*, remarking that they disagree in several characters with the genotype, but all have very long hind femora and as a rule a few very long spines on the basal half. Schouteden in 1934 gave as the generic character of *Podogomphus* the few long spines on the hind femur, by which he is convinced that the genus can be easily separated from *Notogomphus* Selys. He added that in the cases of the three new species he described, the upper lip is in none truly visible from above.

In 1857, when Selys suggested that *Gomphus ruppeli* Selys and *Gomphus dorsalis* Selys might be separated under the generic name of *Notogomphus*, it was on account of the very great difference in the thoracic pattern from all other species of *Gomphus*. Ris in 1909 commented on the fact that *Notogomphus* had been very imperfectly described, with no really important generic characters, and most species only named on a single specimen. In the same paper he gave a description and figures of the genotype male *Notogomphus ruppeli* Selys, which is in Berlin. The thoracic pattern consists of one complete broad pale band down the centre of dorsum, and one very short beginning of a pale humeral stripe on either suture. The hind femur is long, reaching just beyond the end of the 2nd abdominal segment. There is a basal subcostal nervule (" basale-subcostalquerader") in all four wings. Campion in 1923 described two new species of *Notogomphus*, the types of which are in the British Museum collection. Campion was doubtful that *Podogomphus* Karsch is distinct from *Notogomphus* Selys, as he could find no good characters to separate them. In the British Museum is a series of *Notogomphus dorsalis* Selys which I am sure are correctly named, and have the hind femur reaching to beyond the end of the 2nd abdominal segment. The thoracic pattern is not identical with *N. ruppeli* Selys, but is very similar. Also the insects are smaller in dimensions. Neither species have any long spines on the hind femur, but both species have a basal subcostal nervule in all four wings. The colour-pattern of *N. dorsalis* is practically repeated in the types of *N. longus* Martin, *N. lecythus* Campion and

N. immisericors Campion, and is also very similar to that of the genotype. They all have a basal subcostal nervule in all four wings and a long hind femora, although not quite so long as in *Podogomphus spinosus* Karsch and *P. praetorious* Selys. *N. longus* and *N. immisericors* have a few spines on the hind femur as long as any in *Podogomphus* species, while *N. lecythus* has them as short as in *N. ruppeli* or *N. dorsalis.*

The basal subcostal nervules seem to give a sound generic distinction from *Gomphus* (Leach) Selys, as far as our present knowledge goes. I am, however, convinced that *Podogomphus* Karsch is synonymous with *Notogomphus* Selys.

Paragomphus Cowley, 1934.

Mesogomphus Förster, 1906, *Jb. nassau. Ver. Naturk.* **59** : 323 (preoccupied by *Mesogomphus* Davis, 1883). Genotype: *Gomphus cognatus* Rambur, 1842.
Paragomphus Cowley, 1934, *Entomologist*, **67** : 201.

Paragomphus moka sp. n.

♂. Abdomen (without appendages), 30 mm. App., 3 mm. Hind-wing, 25 mm. *Head*: Rear of head, occiput, vertex, basal half of frons, anteclypeus, genae and basal half of labrum, coffee-brown. The rest of frons, post-clypeus and the rest of labrum, green. Labium cream. *Prothorax*: Yellow-green, the median lobe red-brown dorsally. *Synthorax*: Yellow-green, with a few rather obscure brown markings as follows: a narrow stripe down centre of thorax not reaching the anterior end; a narrow stripe along the humeral suture, and an antehumeral stripe of the same width branching from it at a sharp angle about one-fourth of the distance from the posterior end; a short stripe covering the metastigma; a stripe along the 2nd lateral suture which has a short branch towards the 1st lateral suture about half-way. *Abdomen*: (discoloured). Reddish-brown with the following black: terminal rings on 2–9 segments, a stripe along the ventral carinae of 3–6 segments and a narrow ring at one-third of the length from the anterior carina, broad edges to the lobes on 8–9 segments, the tips of the superior appendages. The following are yellow-green: 1–2 segments including auricles, two-thirds of the dorsum of 7th segment, possibly 10th segment in life which has two short pointed black marks anteriorly on dorsal surface and one laterally near ventral surface. *Leg*: Tarsus and tibia black, femur red-brown, broadly yellow-green on the sides. *Wing*: Hyaline. Costa black. Pterostigma red-brown, covering five cells, a very dark brown border along costal edge one-third the width of *Pt.*

Holotype ♂ and one paratype ♂, 28.i to 3.ii.1933. Fernando Po: Moka (*W. H. T. Tams*). In British Museum.

Paragomphus moka closely resembles *P. elpidius* Ris, both in colour pattern and in genitalia.* The following are the principal differences :—

P. elpidius.	*P. moka.*
Costa yellow.	Costa black.
Tips of superior appendages smooth and pointed.	Tips of superior appendages blunt and dentate (fig. 5.).
Anal appendages, which curl completely under, 1·5 mm. longer than 9–10 segments.	Anal appendages, which closely resemble those of *P. cognatus* Ramb. as long as 9–10 segments.

Phyllogomphus Selys, 1854.

Phyllogomphus Selys, 1854, *Bull. Acad. Belg.* (2) **21** : 43. Selys, 1857, *Mon. Gomph.* : 110. Genotype: *Phyllogomphus aethiops* Selys, 1854.

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* Ris, 1921, *Ann. S. Afr. Mus.* **18** : 346.

Phyllogomphus aethiops Selys.

Phyllogomphus aethiops Selys, 1854, *Bull. Acad. Belg.* (2) **21** : 43. Selys, 1857, *Mon. Gomph.* : 111 and 407. Selys, 1878, *Bull. Acad. Belg.* (2) **46** : 439.
Phyllogomphus helenae Lacroix, 1921, *Ann. Soc. linn. Lyon.* **67** : 49.

I believe Selys' description (1878) of the female of *Phyllogomphus aethiops* from one specimen in the MacLachlan collection from the Cameroons, to be

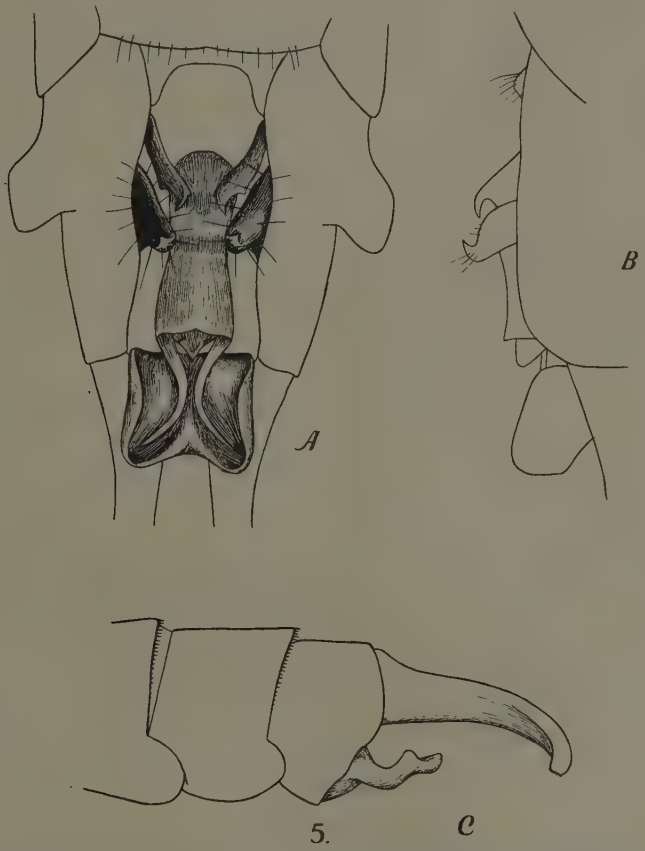

Fig. 5.—*Paragomphus moka* sp. n. *a*. Accessory genitalia of type ♂ from above. *b*. The same from the side. *c*. Anal appendages of ♂ from the side.

mistaken. There has recently been added to the British Museum collection, a female from Njala, Sierra Leone, taken at light 20.vi.1927 (*E. Hargreaves*), which so closely resembles the type male in the same collection, from the River Gambia, as to be practically identical. The face of the female is more olive-brown than the red-brown of the male type, but the occiput is yellowish-red in both, although that of the female is badly damaged, and the rear of the head is black in both. Both have the same obscure pale bands on the velvety-black thorax, in life possibly green, but in death either yellowish or reddish. These

consist of a narrow antehumeral not quite reaching to the pale collar, a longer narrow humeral, and 3 broad bands on the side. Legs with brown on the femur and the rest black. The descriptions by Selys (1857) of the colouring and markings of the abdomen of the male, correspond exactly with those of the female from Sierra Leone. The 8–9 segments are 0·5 mm. shorter than in the type and the 10th segment 0·5 mm. longer. The vulvar scale in this female specimen reaches to one-third the length of the 10th segment. The wings in the female are lightly tinged with saffron, not thickly clouded as in the type, and whereas there is scarcely more than a trace of orange at the wing bases of the type, in the Sierra Leone female the orange almost reaches the first nervule in the costal, subcostal and submedian spaces. The neuration is entirely black as in the type, and the pterostigma the same black-brown, but is 1 mm. longer in all four wings in the female.

This female from Sierra Leone is not only distinct from the MacLachlan specimen from Cameroons, by the number of thoracic stripes, but has also a very different vulvar scale.

On the other hand, Lacroix's unique female of *Phyllogomphus helenae* from Sierra Leone is, without doubt, from the description, the same as the British Museum specimen from the same country. René Martin's specimen from French Niger, which he named *Ph. aethiops* Selys, is clearly distinct by the yellow costa and pterostigma,* but the specimen can no longer be traced in the Paris Museum collection.

Phyllogomphus aethiops Selys is separated from the only other named species, *P. coloratus* Kimmins † and *P. selysi* Schouteden,‡ by both the latter having only 2 pale bands on the sides of the thorax, no humeral stripe, and by being larger and darker insects. The female *Phyllogomphus* specimen in the MacLachlan collection, from the Cameroons, is not referable to any of the three known species. It will have to remain unnamed until this collection, if ever, becomes once more available for study.

As there seems to have arisen some slight confusion as to the type locality of *P. aethiops* Selys, I have enumerated below where all three species have been found.

Phyllogomphus aethiops Selys, ♂ (genotype), River Gambia (Brit. Mus.), ♀♀, Sierra Leone (Brit. Mus. and Lacroix Coll.), Congo (Paris Mus.).

Phyllogomphus coloratus Kimmins, ♂ and ♀ (types), Fernando Po (Brit. Mus.).

Phyllogomphus selysi Schouteden, ♂ and ♀ (types), and paratypes, Belgian Congo (Tervueren Mus.).

Aeshnidae.

Aeshna Fabricius, 1775.

Aeshna Fabricius, 1775, *Syst. Ent.*: 424. Cowley, 1934, *Entomologist*, **67**: 249. Genotype: *Libellula grandis* Linné, 1758.

Aeshna rileyi Calvert.

Aeschna rileyi Calvert, 1892, *Trans. amer. ent. Soc.* **19**: 164. Calvert, 1895, *Proc. U.S. nat. Mus.* **18**: 138. Sjöstedt, 1906, *Kilimandjaro-Meru Exp.* (Pseudoneuropt.): 33. Martin, 1908, *Cat. Coll. Selys.* **18** (Aeschnines): 65.

Aeschna subpupillata MacLachlan, 1896, *Ann. Mag. nat. Hist.* **17**: 422. R. Martin, 1908, *Cat. Coll. Selys.* **18** (Aeschnines): 68. Ris, 1921, *Ann. S. Afr. Mus.* **18**: 361.

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* Martin, 1900, *Bull. Mus. Hist. nat. Paris*, **6**: 105.

† Kimmins, 1931, *Ann. Mag. nat. Hist.* (10) **7**: 217.

‡ Schouteden, 1933, *Rev. Zool. Bot. afr.* **23**: 340.

When Sjöstedt described the male of *Aeshna rileyi*, fourteen years after Calvert had named it from one female taken in the same locality (Mount Kilimandjaro, Tanganyika), there could be little doubt of the correct identification as he had females also which exactly resembled the type description. All the same Calvert described his type ♀ as having a narrow humeral line as well as a short antehumeral stripe, whereas Sjöstedt only mentioned the latter on the male. This humeral line, however, is such an obscure feature, that it may well have been overlooked. Calvert's type was 48 mm. long including the appendages (5 mm.). The pterostigma was 4 mm. in length, and the membranule grey and white. Sjöstedt's females were 45–49 mm. in length without appendages and the *Pt.* 4·2 mm. (6 specimens). The males varied from 44 to 46 mm. in length without appendages (5–5·5 mm.), with *Pt.* 4 mm. (6 specimens). Membranules grey and white. Martin described a male, from the type locality, with only short antehumeral stripes scarcely visible, but said the female has humeral lines as well. Length of ♂ 55 mm. ♀ 48 mm. (presumably with appendages). Membranule grey and white.

When MacLachlan described *Aeschna subpupillata* in 1896, it was from a pair of small insects taken in S.E. Africa (Caffraria and Transvaal). The length of both with appendages was only 45 mm., *Pt.* 3·25 mm., and there was only the faintest vestige of an antehumeral stripe, and no humeral line. He remarked that "*A. rileyi* Calvert should belong to another group, being much larger and with humeral as well as antehumeral bands." Sjöstedt remarked in 1906 on the likeness of his specimens of *A. rileyi* Calvert from Kilimandjaro to *A. subpupillata* MacLachlan, in everything, even to the shape of the superior appendages, except that they were larger and with a longer *Pt.* Martin described *A. subpupillata* from MacLachlan's own description, but gave a drawing of the ♂ anal appendages which does not convey a correct idea of the type description. On the other hand, Ris' drawing of the ♂ anal appendages of *A. subpupillata* is like the type, and equally like those of *A. rileyi*. Ris' pair came from Cape Colony, and the dimensions, as he said himself, are smaller than the smallest given for *A. rileyi* (♂ 42·5 mm., *Pt.* 3·5 mm., ♀ 44·5 mm., *Pt.* 3·5 mm.). On the other hand, they agree with the descriptions of the latter, by having a narrow humeral line as well as a short antehumeral stripe. A headless specimen he had seen from Katanga, Belgian Congo, which he thought might be true *A. rileyi* because the length was 51·5 mm., *Pt.* 4 mm., had no humeral lines and membranule dark grey. Schouteden in 1934 * had no doubt the above insect was correctly named, as he had another from the Congo with identical want of markings and typical *A. rileyi* head markings, although it was smaller in dimensions.

In the British Museum collection is a ♀ from Nairobi, Kenya, which resembles MacLachlan's *A. subpupillata*. There is only a faint trace of an antehumeral stripe, the membranule is grey and white, the length 45 mm. with appendages, *Pt.* 3·5 mm. A ♂ in the same collection from Karura, Kenya, is 52 mm. long with appendages, 47 mm. without, *Pt.* 4·5 mm. There is a trace of antehumeral stripe only, and the membranule is grey and white. Also in the collection are three ♂♂ from central Abyssinia. The length is 48 mm. with appendages, 45–46 mm. without, *Pt.* 3 mm. Two have humeral lines and antehumeral stripes, also grey and white membranules. One has no humeral lines and an all grey membranule. Miss M. Steele captured three specimens (now in the Brit. Mus.) in West Darfur on the Jebel Murra. One ♂ has short antehumeral stripes and no humeral lines. The length is 44 mm. without appendages, 50 mm. with, *Pt.* 3 mm. One ♀ has no antehumeral stripes, but faint humeral

* Schouteden, 1934, *Ann. Mus. Congo belge* (3) **3** (Odonates 1) : 49.

lines. The length is 46 mm. without appendages, 51 mm. with, *Pt.* 3 mm. One ♂, taken at 8000 ft. altitude, has humeral lines and short antehumeral stripes. The length is 43 mm. without appendages (broken), *Pt.* 3 mm. All three insects have all-grey membranules. I took a ♀ at Victoria Falls, S. Rhodesia, which could be *A. subpupillata* by the absence of thoracic markings, having no humeral lines whatever and scarcely a trace of antehumeral stripes either. The wings are strongly clouded as in old age, the membranule grey and white. On the other hand, the dimensions are those of *A. rileyi*, 48 mm. with appendages, 45 mm. without, *Pt.* 4·5 mm. I have also seen a male from the Paris Museum, taken on Mt. Elgon, Kenya, with antehumeral stripes only. The dimensions are 51 mm. with appendages, 45 mm. without, *Pt.* 3 mm. and membranule grey and white.

It will be seen from the above facts that the dimensions of the abdomen, anal appendages and pterostigma, are very variable, together with the presence or absence of humeral lines and even antehumeral stripes, also the colour of the membranule, and that these separate characters are not constant in a series of thirty insects examined, ranging from Abyssinia to S. Africa. In all, however, the very distinctive marking of the frons is present. This comprises an almost round black spot in a yellow ring, inside a dark circle. In addition, all have the vertex black in front and yellow above, the occipital triangle yellow and the male anal appendages identical in shape.

I am of the opinion that central Africa from Tanganyika to the Congo, constitutes the main habitat of *Aeshna rileyi* Calvert, that the insect has spread north and south from there, becoming smaller in its general dimensions. *Aeshna subpupillata* MacLachlan therefore becomes a synonym of *Aeshna rileyi* Calvert.

Anax Leach, 1815.

Anax Leach, 1815, *Brewster's Edinb. Encycl.* **9** : 137. Genotype: *Anax imperator* Leach, 1815.

Anax imperator mauricianus Rambur.

Anax mauricianus Rambur, 1842, *Hist. nat. Ins. Neuropt.* : 184. Ris, 1908, *Denkschr. med.-naturw. Ges. Jena* **13** : 320.

This species of *Anax* is very common in Africa, and I took a few males in different localities to see if there was any noticeable variation. Two from Kenya and two from Uganda from the eastern slopes of the central African mountain ranges, are true to type, but a male captured at Lake Mutanda, Birunga Mountain Plateau, Kigezi District, Uganda, on the western side of the range, and close to the Congo border, shows marked differences.

The green parts are much browner than in the typical *mauricianus*, the wings have a darker costa and an opaque cloud on the saffroned surface. The mark on the frons is far larger and with a broader base. In colouring it certainly tends towards *A. chloromelas* Ris from the Congo and west Africa,* but the anal appendages are identical with those of *A. mauricianus*. The following data were noted at the time of capture : " Brownish-green face and thorax, azure-blue on abdomen," in distinction to the other specimens noted as : " grass-green face, thorax and 1st abdominal segment, azure-blue on abdomen."

Heliaeschna Selys, 1882.

Heliaeschna Selys, 1882, *C. R. Ass. franç. Av. Sci.* **10** : 667. Selys, 1883, *Bull. Acad. Belg.* (3) **5** : 746. Genotype : *Heliaeschna fuliginosa* Karsch, 1893 (*ex* Selys, 1883. nomen nudum).

Of the three known African species of *Heliaeschna*, the genotype *H. fuliginosa*

* Ris, 1911, *Ann. Soc. ent. Belg.* **55** : 321.

Karsch, came from the Cameroons, a pair having been described by Karsch in 1893,* the first specific description given to the insect, although Selys had a male from the same country, on which he founded the genus in 1882. In both sexes the abdomen is constricted at the 3rd abdominal segment, and the legs are reddish-brown on the femora and black on the tibiae and tarsi. In *H. ugandica* MacLachlan,† the abdomen is also constricted in both sexes. The legs are almost entirely reddish-brown. *H. lanceolata* Le Roi was described from one male from the Congo,‡ and Schouteden had males and females from the same country § and the British Museum has a male from Sierra Leone, which like Schouteden's examples has a well-developed T on the frons, but anal appendages as figured by Le Roi. This species has the abdomen very constricted and quite well marked, the legs mostly reddish-brown and the occipital triangle black.

Recently added to the British Museum collection are three females of two species of *Heliaeschna*. Two specimens of one species are from Uganda. They are much lighter in colour and are slenderer insects than *H. fuliginosa* Karsch with the abdomen very constricted at the 3rd segment.

Description :—Face greenish-yellow, a well marked slender T on frons, occipital triangle yellow; thorax and abdomen brown, the former possibly green in life, the only markings a broad blackish band along the 2nd lateral suture, with a cream stripe in front, the latter crossing the tergum just behind the fore-wings but not completely encircling the body; legs red-brown, extreme base of femora black; wings tinged golden-brown along the costa to *Pt.* and the subcosta to nodus, with a deeper colour at base to the first thickened antenodal and the first veins in median and submedian spaces; costal vein reddish-brown, pterostigma pale yellow between black veins. Antenodals $\frac{30 \mid 31}{24 \mid 24}$ and $\frac{32 \mid 31}{24 \mid 23}$, postnodals $\frac{24 \mid 22}{25 \mid 27}$ and $\frac{22 \mid 20}{24 \mid 25}$. Dimensions: Abd. 53 mm. without appendages (broken), hind-wing 52–53 mm., *Pt.* 5–5·5 mm. fore-wing, 4–5 mm. hind-wing.

I believe these may represent a new species, but without a male specimen it would be most unwise to name them as such. On the other hand, the third female specimen mentioned, belongs without doubt to a new species, and is unique in *Heliaeschna* by having a non-constricted abdomen. I do not, however, wish to name it from one female specimen only. The insect was taken in a cave on the 1st plateau of Mt. Cameroon, by *Miss M. Steele* 12.i.1932.

Description :—Face ochreous with a broad T on frons, occipital triangle yellow; thorax and first two abdominal segments light reddish-brown, possibly greenish in life, the 2nd lateral suture with a narrow black band; rest of abdomen dark brown, a large reddish patch on either side of 9th segment touching the anterior carina; legs reddish, extreme base of femora black; a trace of golden-brown at extreme base of wings, costal vein reddish-brown, *Pt.* yellow between black veins. Antenodals $\frac{36 \mid 38}{28 \mid 28}$ postnodals $\frac{26 \mid 26}{31 \mid 28}$. Dimensions: Abd. 55 mm. without appendages (broken), hind-wing 53 mm., *Pt.* 4·5 mm. fore-wing, 4 mm. hind-wing.

Corduliidae.

Macromia Rambur 1842.

Macromia Rambur, 1842, *Hist. nat. Ins. Neuropt.*; 137. Genotype: *Macromia cingulata* Rambur, 1842.

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* Karsch, 1893, *Ent. Nachr.* **19** : 194.
† MacLachlan, 1896, *Ann. Mag. nat. Hist.* (6) **17** : 419.
‡ Le Roi, 1915, *Ergebn. 2te deuts. Z.-Afr. Exp.* 1910–11. **1** : 346.
§ Schouteden, 1934, *Ann. Mus. Congo belge* (3) **3** (Odonates 1) : 50.

Macromia reginae Le Roi.

Macromia reginae Le Roi, 1915, *Ergebn. 2te deuts. Z.-Afr. Exp.* 1910–11. **1** : 348. Ris, 1917, *Rev. suisse Zool.* **25** : 147.
Macromia halei Fraser, 1928, *Trans. ent. Soc. Lond.* **76** : 137.

Le Roi described *M. reginae* from a single well-marked ♂ from the Sudan. Fraser described *M. halei* from two ♀♀ from Lake Victoria, Uganda, the type in the British Museum being a very dark insect. Ris described a dark male from Jinja, Lake Victoria, as *M. reginae* Le Roi and a ♂ and ♀ are in the British Museum taken in 1928 in the same locality. The ♀ is a replica of Fraser's type female, while the ♂ is practically a replica, according to Ris' description, of the ♂ of *M. reginae*. Another ♂ in the British Museum from Nyasaland, taken in 1913, is identical with the Uganda ♂ in genitalia, venation, dimensions, everything except markings, which exactly resemble the description given by Le Roi for the type. With this evidence, I have no hesitation in declaring *M. halei* Fraser a synonym of *M. reginae* Le Roi.

Libellulidae.

Tetrathemis Brauer, 1868.

Tetrathemis Brauer, 1868, *Verh. zool.-bot. Ges. Wien.* **18** : 182. Genotype : *Tetrathemis irregularis* Brauer, 1868.

Tetrathemis corduliformis sp. n.

♂. Abdomen, 19·5 mm. Hind-wing, 22·5 mm. *Head* : Labium yellow, broadly black in the centre. Mandibles mahogany-brown. Labrum black, clypeus translucent green. Frons red-brown, metallic blue on top and vertex metallic blue. Occipital triangle red-brown, rear of head black. Thorax and abdomen very pruinose, markings obscure, but the following seems to be the ground-colour and pattern. *Prothorax* : Black. *Synthorax* : Black dorsally with a greenish band down centre and a broad greenish band along humeral suture curving inwards at antealar sinus. Another broad greenish band along 2nd lateral suture with a narrower branch starting from the metinfraepisternum and reaching obliquely towards the humeral suture. A third broad greenish band edges the metepimerum and meets across the sternum. *Leg* : Black. Coxa and trochanter greenish-brown, slightly pruinose, the same colour half-way up inside of femur. *Abdomen* : No definite markings to be seen. Sides of 1–5 segments obscurely greenish, 7–10 segments and superior anal appendages red-brown. The last four segments are somewhat dilated and the anal appendages very broad, heavy and corduline in appearance (fig. 6). *Wing* : Faintly tinged yellow. *Pt.* almost black, 2·5 mm. long. One cubito-anal cross-vein in fore-wing, two in hind-wing. Antenodals $\frac{8 \mid 8}{7 \mid 7}$ Postnodals $\frac{6 \mid 6}{7 \mid 7}$.

Holotype ♂, 18.ii.1934. Uganda : Nyamagita Dam, Budongo Forest, Bunyoro District (*C. E. Longfield*). In British Museum.

This insect probably closely resembles *Tetrathemis camerunensis* Sjöstedt in colouring, when in good condition. It differs in the much broader 8–10 segments and in the genitalia, also the anal appendages are widely different in shape from all the other species known.

Orthetrum Newman, 1833.

Orthetrum Newman, 1833, *Ent. Mag.* **1** : 511. Kirby, 1889, *Trans. zool. Soc. Lond.* **12** : 302. Ris, 1909 (additions 1916), *Cat. Coll. Selys* **10** (Libell. 1) : 176. Genotype : *Libellula coerulescens* Fabricius, 1798.

In spite of Ris' classical work on this genus, many species so closely resemble each other in general facies, that they are apt to be very mixed in collections.

Should the genitalia not be in good condition, the separation of the species is rendered very difficult. It is with the view to assisting in the classification of the African species of *Orthetrum* that I give the following notes, based on a study of a very large number of specimens. Those species confined to the Mediterranean region are not included.

1. *Orthetrum taeniolatum* Schneider.

Libellula taeniolata Schneider, 1845, *Stettin. ent. Ztg.* **6** : 111.

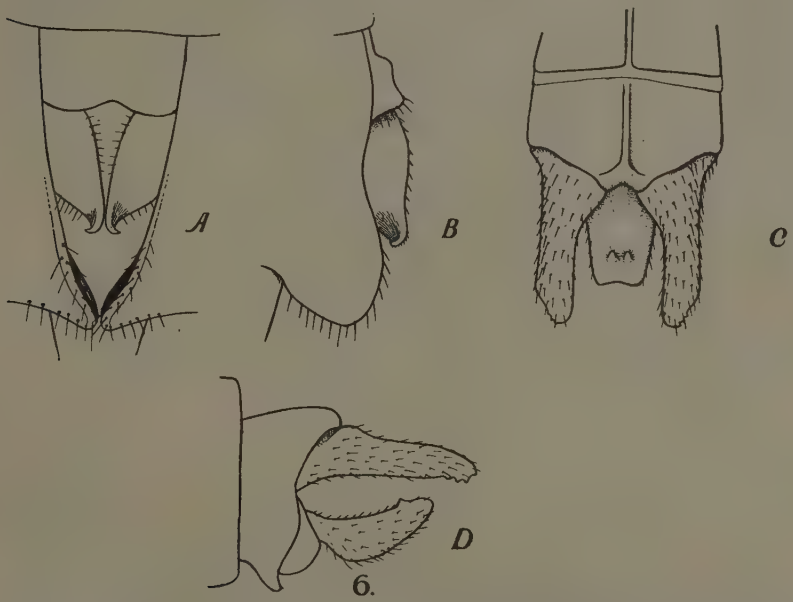


FIG. 6.—*Tetrathemis corduliformis* sp. n. *a*. Accessory genitalia of type ♂ from above. *b*. The same from the side. *c*. Anal appendages of ♂ from above. *d*. The same from the side.

2. *Orthetrum caffrum* Burmeister.

Libellula caffra Burmeister, 1839, *Handb. Ent.* **2** : 856.

The ranges of these two species meet in the Sudan, where they resemble each other very closely. Further south *O. caffrum* becomes darker and more pruinose when adult, losing the pattern of light bands on the thorax. In its northern habitat these bands seem to be always very conspicuous, as they are on *O. taeniolatum*. The latter is a smaller insect and has a much shorter pterostigma, but the only constant differences between the species to be found in both sexes, are the following :—

O. caffrum.	*O. taeniolatum.*
No black on first segments of abdomen dorsally.	Black markings dorsally on first segments of abdomen.
Membranule dark grey.	Membranule whitish.

In the males the position of the hook on the hamule, provided it is not turned sideways, will differentiate the species. In *O. caffrum* it is up-turned, in *O. taeniolatum* down-turned.

3. *Orthetrum microstigma* Ris.

Orthetrum microstigma Ris, 1911, *Rev. Zool. afr.* **1** : 128.

This is the only other species that has the same shaped hamule in the male as the two previous species, but in colouring it is so dark when adult, as to be impossible to mistake for *O. caffrum*, and when juvenile the markings resemble *O. stemmale capense*. From the latter it can be separated fairly easily by the short pterostigma.

4. *Orthetrum stemmale capense* Calvert.

Libellula (*Orthetrum*) *capensis* Calvert, 1893, *Proc. U.S. nat. Mus.* **16** : 584.

5. *Orthetrum brachiale* Beauvois.

Libellula brachialis Beauvois, [1813–20], *Ins. Afr. Amér.* : 171.

6. *Orthetrum chrysostigma* Burmeister.

Libellula chrysostigma Burmeister, 1839, *Handb. Ent.* **2** : 857.

7. *Orthetrum guineense* Ris.

Orthetrum chrysostigma guineense Ris, 1909, *Cat. Coll. Selys* **10** (Libell. 1) : 207.

8. *Orthetrum abbotti* Calvert.

Orthetrum abbotti Calvert, 1892, *Trans. amer. ent. Soc.* **19** : 162.

9. *Orthetrum icteromelas* Ris.

Orthetrum icteromelas Ris, 1909, *Cat. Coll. Selys* **10** (Libell. 1) : 197.

Of these six different species, *O. stemmale capense* Calvert seems to be the commonest and to have the widest range, but the ranges of all six overlap in many parts of Africa. Ris made geographical subspecies out of *guineense* and *abbotti*, but from the collections I have studied, this cannot hold good and I prefer to give them the status of species. *O. stemmale capense* varies in shade, but always seems to be darkest on the west coast. The thorax is greenish-brown and strongly marked with black stripes. To the east, north and south the specimens lose many of the markings, which are anyhow completely obscured on pruinose specimens. All the veins, however, are black, the wing tips very rounded, the *Pt.* fairly large and very dark and only a single row of cells between the *Rs* and *Rspl*, with the occasional exception of an odd cell divided in the centre.

O. brachiale is always lighter in colouring than the last species, with a greener thorax if not obscured by pruinosity, also the black is less. The pterostigma is always light brown or yellow, however mature the specimen, and has a very thick black costal edge. The subcostal antenodals are pale, also the costal vein, at least as far as the nodus. There is usually a double row of cells between the *Rs* and *Rspl* for the greater part of the length, and the vein M_2 is exceptionally curved. It is very like *O. chrysostigma*, but this latter species has one white thoracic stripe laterally, usually only one row of cells between *Rs* and *Rspl* and a straighter M_2. In genitalia *O. chrysostigma* closely resembles *O. stemmale*

capense, from which it can be distinguished by its *brachiale*-like colouring, the invariably light subcostal antenodals and the light red-brown *Pt.*

O. guineense can only really be distinguished from *O. chrysostigma* by the male genitalia. It is more constant to the rule of only one row of cells between the *Rs* and *Rspl*, but these cells are not an infallible character with the *Orthetrum*. *O. abbotti* is much smaller in size, with a very large *Pt.* in comparison. This species is without the white thoracic stripe, is often plain yellow laterally on the thorax, or yellow with bands of pruinose blue. The wings, too, are very broad at the tips. In the male genitalia, *O. chrysostigma* has the upper part of the hamule (I*a*) with quite large rounded hooks projecting to the end of the anterior lamina. The lower part (*Aa*) of the hamule is inconspicuous and comes closely up to the hook, with a very small gap between. In *O. guineense* it is just the other way about. The upper part of the hamule (I*a*) is exceedingly small, with a small hook turned backwards. The lower part (*Aa*) is very prominent and as long as the anterior lamina. In *O. abbotti* the upper part of the hamule (I*a*) is longer than the lower part (*Aa*) and has a slender hook turned outwards, the lower part (*Aa*) being short, fat and truncated.

O. icteromelas is marked like *O. stemmale capense*, but is separated by the yellow costal vein for its entire length, the yellow subcostal antenodals and the yellow *Pt.* In the male genitalia of *O. icteromelas*, the anterior lamina is only as long as the hamule, while in *O. stemmale capense* the hamule is a good bit longer than the anterior lamina.

The subspecies of *O. stemmale*, besides differing in the genitalia and a few points of colouring, seem also to be confined to the oceanic islands on which they were first found, with the exception of the new subspecies described below.

Orthetrum stemmale kalai subsp. n.

♂ Abdomen, 30 mm. Hind-wing, 31 mm. *Pt.* 3 mm. A very dark *Orthetrum* with pruinose abdomen, dark venation and *Pt.* as in *O. stemmale capense* Calvert. Dimensions much the same. The shape of the frons and genitalia are very close to those of *O. stemmale wrighti* Selys,* but differ in the following particulars :—

O. s. wrighti.	*O. s. kalai.*
Frons black at base.	Frons all olive-green.
Anterior lamina deeply furrowed down centre, including tip.	Anterior lamina slightly furrowed in centre, but not reaching tip, which is smooth and rounded (fig. 7).

From *stemmale capense*, *stemmale kalai* differs in the following outward points, which, however, do not constitute easy points of identification, with the exception of the last : the row of cells between *Rs* and *Rspl* are double in the centre, the golden-brown fleck at the base of wings is very reduced, the 1–3 abdominal segments are slightly more inflated and the 4th segment definitely more restricted, also the frons is square instead of narrowing at the top as it does in *stemmale capense*. The greatest difference is in the genitalia, as follows :—

O. s. capense.	*O. s. kalai.*
Anterior lamina never projects beyond hamule and is covered in hairs.	Anterior lamina projects well beyond hamule, has short spines, but no hairs.
Anterior lamina curves gradually to a hump from base to centre, where it is very convex and tapers towards tip.	Anterior lamina is humped at extreme base, flat in centre, very dilated at the tip.
Hook of hamule rounded on the outer edge and tip rather blunt.	Hook of hamule with very straight outer edge and tip very pointed.

* Selys, 1869, *Ann. Soc. ent. Belg.* **12** : 95.

Holotype ♂, 7.iv.1934. Southern Rhodesia. Zambesi River, Kalai Island, Victoria Falls (*C. E. Longfield*). In British Museum.

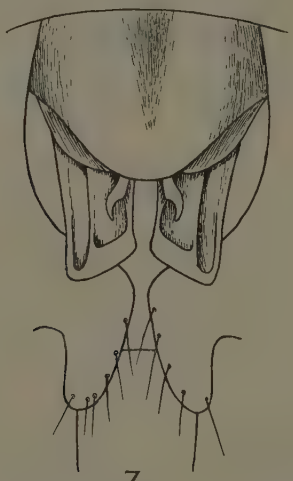
10. *Orthetrum farinosum* Förster.

Orthetrum farinosum Förster, 1898, *Ent. Nachr.* **24** : 169.

11. *Orthetrum azureum* Rambur.

Libellula azurea Rambur, 1842, *Hist. nat. Ins. Neuropt.* : 68.

These two species differ from all the other African species of the same size, in not having the abdomen constricted at the 4th segment. *O. farinosum* is extraordinarily pruinose all over, with completely hyaline wings in the male, but often with brown tips in the female. *O. azureum*, which seems to be confined to Madagascar, has a big patch of saffron at the base of the wings in the males.



7.

Fig. 7.—*Orthetrum stemmale kalai* subsp. n. Accessory genitalia of type ♂ from above.

12. *Orthetrum africanum* Selys.

Lepthemis sabina var. *africana* Selys, 1887, *Ann. Soc. ent. Belg.* **31** : 22.

13. *Orthetrum sagitta* Ris.

Orthetrum sagitta Ris, 1916, *Cat. Coll. Selys* **16** (Libell. 3) : 1086.

14. *Orthetrum sabina* Drury.

Libellula sabina Drury, 1770, *Illustr. exot. Ins.* **1** : 114, tab. 48.

These three species have the abdomen abnormally constricted at the base of the 4th segment and continue with a very slender abdomen. The first three segments are also very dilated beneath. All three have very different genitalia in the male, but the first two can also be separated by the following points :—

O. africanum.	*O. sagitta.*
Middle of the labium and the entire labrum black.	Entirely yellow.
First three segments of the abdomen exceptionally short.	As long as in the other species of *Orthetrum*.
4th segment 7 mm. long.	4th segment only 5 mm. long.

O. sabina is a very large edition of *O. sagitta* with the following conspicuous differences : pale costal vein and light-coloured pterostigma, yellow anal appendages, paler dorsal surface to the thorax, last three abdominal segments dilated.

15. *Orthetrum kristenseni* Ris.

Orthetrum kristenseni Ris, 1911, *Rev. Zool. afr.* **1** : 126.

16. *Orthetrum angustiventre* Rambur.

Libellula angustiventris Rambur, 1842, *Hist. nat. Ins. Neuropt.* : 59.

17. *Orthetrum trinacria* Selys.

Libellula trinacria Selys, 1841, *Rev. Zool.* : 244.

18. *Orthetrum austeni* Kirby.

Thermorthemis austeni Kirby, 1900, *Ann. Mag. nat. Hist.* (7) **6** : 72.

These four species are all very easy to identify. *O. kristenseni* has a bright yellow band all along the costa and subcosta from the base of the wings through and beyond the pterostigma. The only other African *Orthetrum* resembling it in wing and thoracic colouring is *O. angustiventre*, which is otherwise unique in the number of cells between the *Rs* and *Rspl.* In addition, *kristenseni* is of normal length and has a small pterostigma, whereas *angustiventre* has a very long, cylindrical abdomen and a huge pterostigma. *O. trinacria* has an even longer abdomen of the same non-constricted shape laterally, but has the first three segments dilated ventrally, it has also normal venation. *O. austeni* is an immense insect with a very broad, non-constricted abdomen. It resembles *angustiventre* in the size of the pterostigma, the doubly crossed *T* in fore-wing and the large amount of cells in the *Ti*, but is normal in the matter of cells between the *Rs* and *Rspl.* I have extended the known range of this handsome western species farther east by 7° L.

Helothemis Karsch, 1890.

Helothemis Karsch, 1890, *Berlin ent. Z.* **33** : 377. Ris, 1912, *Cat. Coll. Selys* **14** (Libell. 2) : 754.
Genotype : *Libellula dorsalis* Rambur, 1842.
Stoechia Kirby, 1898, *Ann. Mag. nat. Hist.* (7) **2** : 235.
Misthotus Kirby, 1905, *Ann. Mag. nat. Hist.* (7) **15** : 192.

I consider that the genus *Helothemis* had better remain on the two characters in which it differs from the species of *Trithemis* at present known. The best character is the black lateral stripes on the thorax never being fused into an horizontal band, as they always are on juvenile males and the females of *Trithemis*. The other character is only constant in the males of *Helothemis*, the last antenodal being complete in all four wings. Should a species of *Trithemis* be discovered in which either of these characters are found, then the genus *Helothemis* will have to fall.

Helothemis dorsalis Rambur.

Libellula dorsalis Rambur, 1842, *Hist. nat. Ins. Neuropt.* : 89.
Stoechia distanti Kirby, 1898, *Ann. Mag. nat. Hist.* (7) **2** : 236.
Misthotus marshalli Kirby, 1905, *Ann. Mag. nat. Hist.* (7) **15** : 192.
Misthotus ambiguus Kirby, 1905, *Ann. Mag. nat. Hist.* (7) **15** : 193 (Cape Colony only).

The type of *Stoechia distanti* of Kirby was in the Distant collection until fairly recently, when the whole collection came to the British Museum. Ris never saw the type and seems to have taken Förster's word that *Stoechia* was a synonym of *Trithemis*.* Whether Förster ever saw the type or not, is not recorded, but the fact has now come to light that it is nothing more than a specimen of *Helothemis dorsalis* Rambur. It is amazing that Kirby could have described this insect as belonging to a new genus, when in the same paper he correctly named two other specimens as *Helothemis dorsalis*. It is true that the *Stoechia* type has gone quite black in colour, while the others are pruinose, rendering them the usual indigo-blue shade, but in all other respects they are exactly similar. The allotype female of *Stoechia distanti* appears to be lost. The British Museum has a female specimen from the Distant collection from the type locality, which resembles Kirby's description in all respects with the exception of the number of antenodals and postnodals in all four wings.

Of Kirby's *Misthotus marshalli*, the British Museum now possesses four specimens, the two cotype males, the female taken *in cop.* with one of them, and an immature male. The fifth specimen, another immature male, I am unable to trace. All of them are specimens of *Helothemis dorsalis* Rambur. As for *Misthotus ambiguus* Kirby, the so-called cotypes are not of the same species, or as things at present stand, of the same genus. Only the specimen from Cape Colony belongs here.

Several of the female *H. dorsalis*, especially those from S. Africa, have bright yellow patches along the costa and at the nodus in all four wings.

Trithemis Brauer, 1868.

Trithemis, Brauer, 1868, *Verh. zool.-bot. Ges. Wien* **18** : 176. Ris, 1912, *Cat. Coll. Selys* **14** (Libell. 2) : 757. Genotype : *Libellula aurora* Burmeister, 1839.

Trithemis pruinata Karsch.

Trithemis pruinata Karsch, 1898, *Ent. Nachr.* **24** : 342. Karsch, 1899, *Ent. Nachr.* **25** : 369 (Togo ♂ only).

Although this species closely resembles *Helothemis dorsalis* Rambur, it is a true *Trithemis* by the incomplete last antenodal in the fore-wings and the fused lateral thoracic stripes in all non-pruinose specimens. The male genitalia are also different :—*H. dorsalis* has short spines on the dorsal surface of the anterior lamina and a tuft of long, fine hairs at the tip (fig. 8), while *T. pruinata* has no spines whatever and a tuft of short, stiff bristles (fig. 8), also the hamule is shorter than the lobe, while the reverse is the case in *H. dorsalis*. I had this identification verified by a drawing of the type specimen of *Trithemis pruinata* in the Zoologisches Museum der Universität, Berlin, kindly supplied by Dr. Erich Schmidt. *Trithemis pruinata* is mostly found in west Africa.

Trithemis risi sp. n.

Trithemis distanti distanti Ris, *nec* Kirby, 1912, *Cat. Coll. Selys* **14** (Libell. 2) : 791.
Misthotus ambiguus Kirby, 1905, *Ann. Mag. nat. Hist.* (7) **15** : 193 (Transvaal only).

Owing to the original mistake in the identification of *Stoechia distanti*

* Förster, 1906, *Jber. Ver. Naturk. Mannheim*, **71–72** : 20; 1906, *Jb. nassau. Ver. Naturk.* **59** : 313.

Kirby, this *Trithemis*, so common in most parts of Africa, has been masquerading for thirty-seven years under the wrong name in collections.

It very closely resembles the two previous species in facies, but is easily separated by the male genitalia. Here, again, there are no spines on the anterior lamina and only a short tuft of bristles, while the shape is different from that of *T. pruinata* Karsch. The hamule is also very different in shape and the lobe is longer and narrower (fig. 8). The females have a narrow, pale line along the lower edge of the dark brown pterostigma. This seems a good distinguishing mark from the females of *T. pruinata*.

I name it after the late Dr. Ris, who has given such full descriptions of both sexes, and such perfect illustrations of the male genitalia of this and the two previous species. In addition, drawings of all three are given here. The study

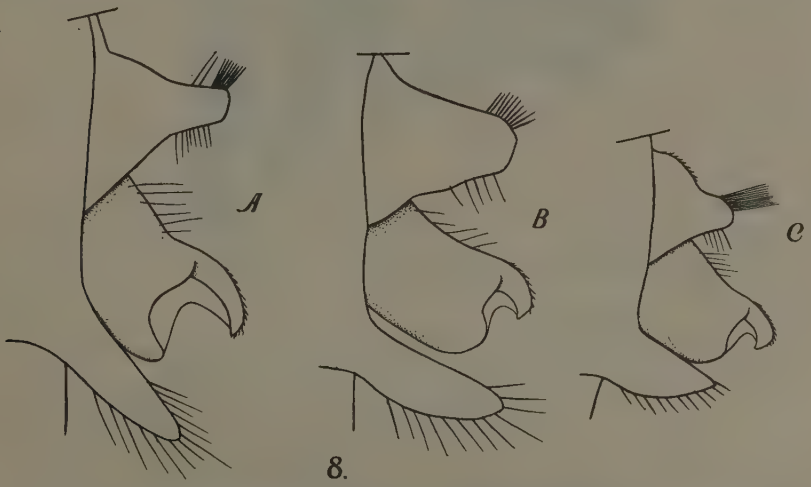


Fig. 8.—♂ accessory genitalia from the side. *a. Trithemis risi* sp. n. *b. Trithemis pruinata* Karsch. *c. Helothemis dorsalis* Rambur.

of these three species has been based on 150 specimens, including all those in the Musée du Congo Belge, Tervueren, for the loan of which I am deeply indebted to Dr. H. Schouteden.

Lectotype ♂ and ♀ have been selected from specimens collected by *Dr. Neave* in British East Africa in 1911. (In British Museum.)

Trithemis donaldsoni nigra subsp. n.

♂. Abdomen, 24·5 mm. Hind-wing, 25 mm. *Head*: Sides of labium, genae, front and sides of frons, yellow. Centre of labium, labrum and clypeus, black. Top of frons and vertex, metallic-blue. Occipital triangle and rear of head, black, with two yellow spots on each orbit. *Prothorax*: Black. *Synthorax*: Glossy black with the following markings in yellow: antehumeral stripe, only a little less wide than its corresponding dorsal black stripe to middle carina, this yellow stripe only reaching three-fourths of the distance to the antealar sinus; an oval spot nearer antealar sinus; a question-like mark in centre of humeral suture, with a round spot above; a tear-like mark at the dorsal end

of the mesepimerum and a round spot at the basal end; a narrow line on 1st lateral suture; a wedge-shaped mark along dorsal edge of the metepisternum; an elongated and a squarish mark on the 2nd lateral suture; a hammer-like mark at the dorsal edge of the metepimerum and the lower edge also yellow (fig. 9). *Leg*: Glossy black. *Abdomen*: Glossy black with the following markings in yellow: A lateral spot on 1st segment; a spot near dorsal

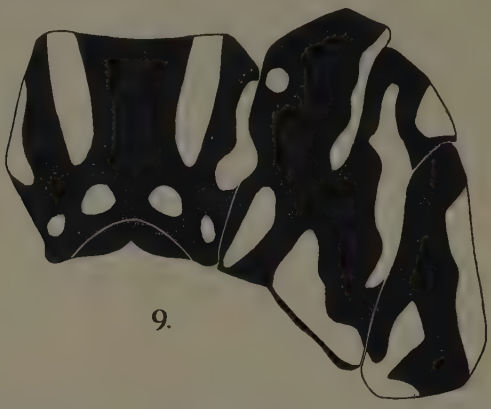


Fig. 9.—*Trithemis donaldsoni nigra* subsp. n. Synthorax of type ♂.

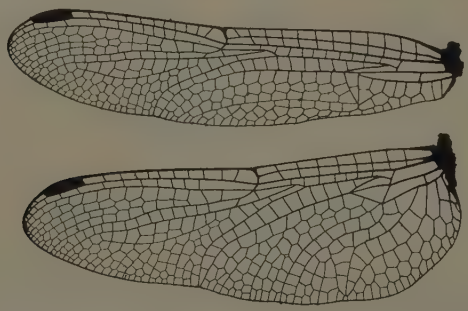


Fig. 10.—*Trithemis donaldsoni nigra* subsp. n. Left pair of type ♂ wings. × 2.

carina, a lateral mark and a spot near ventral carina on 2–3 segments; a narrow line near dorsal carina on 4th segment. *Wing*: Hyaline. Base of fore-wing with a trace of golden-yellow. Base of hind-wing golden-yellow to 1st antenodal, cubito-anal cross-vein and to base of membranule, which is black. Tips of fore-wings rounded. *Pt.* almost black, four times as long as broad (fig. 10).

Holotype ♂, 1.i.1933, paratype ♂ (last 5 abd. segments missing), 7.xii.1932, Principe Island: Ogui Pipi (*W. H. T. Tams*). In British Museum.

This new subspecies resembles *Trithemis donaldsoni basitincta* Ris,* very closely in the colour and the shape of the head, the legs and the abdomen.

* Ris, 1912, *Cat. Coll. Selys* **14** (Libell. 2): 784.

The genitalia are almost identical. The hairs of the head and the thorax are identical, even to the dorsal white tuft just behind the posterior lobe of the prothorax. The two subspecies differ in the following points :—

T. d. basitincta.	*T. d. nigra.*
Frons metallic-violet.	Frons metallic-blue.
Thorax entirely dark pruinose (indigo-blue).	Thorax glossy black with an intricate yellow pattern.
1–2 abdominal segments pruinose-blue with yellow spots.	1–2 abdominal segments entirely glossy black with yellow spots.
Tips of fore-wings pointed.	Tips of fore-wings rounded.
Pt. 7 times as long as broad.	*Pt.* 4 times as long as broad.
Membranule pale grey.	Membranule almost black.
Fleck at base of hind-wing golden-brown.	Fleck at base of hind-wing golden-yellow.
4 rows of cells in anal field.	3 rows of cells in anal field.

PART II. SYSTEMATIC LISTS OF COLLECTIONS OF ODONATA FROM AFRICA.

1. Collection by Miss Cynthia Longfield, Jan.–April, 1934.

Anax imperator mauricianus Rambur. 1 ♂ Kenya, Thika, Kianzabe Estates, 25.i.34. 1 ♂ Kenya, Lake Naivasha, 6.ii.34. 1 ♂ Uganda, Toro District, Ndali Crater Lake, 27.ii.34. 1 ♂ Uganda, Kigezi District, Birunga Mts., 8000 ft., 8.iii.34. 1 ♂ Uganda, Kigezi Dist., Birunga Mt. Plateau, Lake Mutanda, 9.iii.34.

Aeshna rileyi Calvert. 1 ♀ Southern Rhodesia, Victoria Falls, Kalai Island, 7.iv.34.

Aeshna ellioti Kirby. 1 ♂ Uganda, Kigezi Dist., Birunga Mts., 7500 ft., 8.iii.34.

Tetrathemis corduliformis Longfield. 1 ♂ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 18.ii.34.

Micromacromia camerunica Karsch. 1 ♀ Uganda, Buganda Dist., Mabira Forest, 14.ii.34.

Orthetrum austeni Kirby. 3 ♂♂ Uganda, Toro Dist., Ruwenzori Range, Ndali Crater Lake, 27.ii.34.

Orthetrum farinosum Förster. 1 ♂ Kenya, Thika, Kianzabe Estates, 25.i.34.

Orthetrum caffrum Burmeister. 1 ♂ & 1 ♀ *in cop.* Uganda, Toro Dist., Kibale Forest, 26.ii.34.

Orthetrum microstigma Ris. 1 ♂ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 18.ii.34.

Orthetrum stemmale capense Calvert. 6 ♂♂ & 1 ♀ Kenya, Meru Dist., Thoura Forest, 6000 ft., 30.i.34. 1 ♀ Kenya, Meru Dist., Thoura Forest, 5500 ft., 1.ii.34. 2 ♂♂ Uganda, Buganda Dist., Mabira Forest, 14.ii.34. 1 ♂ Uganda, Bunyoro Dist., Budongo Forest, 22.ii.34.

Orthetrum stemmale kalai Longfield. 1 ♂ Southern Rhodesia, Victoria Falls, Kalai Island, 7.iv.34.

Orthetrum guineense Ris. 1 ♂ Kenya, Meru Dist., Thoura Forest, 5500 ft., 27.i.34. 1 ♂ & 1 ♀ Kenya, Meru Dist., Thoura Forest, 6000 ft., 30.i.34. 1 ♂ Kenya, Meru Dist., Lower Thoura Forest, 5000 ft., 1.ii.34.

Palpopleura lucia Drury ♂ form *lucia* Drury. 1 ♂ & 1 ♀ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 16.ii.34. 2 ♂♂ ditto, 18.ii.34.

Palpopleura lucia Drury ♂ form *portia* Rambur. 5 ♂♂ Kenya, Meru Dist., Thoura Forest, 30.i.34.

Acisoma trifidum Kirby. 2 ♂♂ & 1 ♀ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 16.ii.34. 1 ♂ & 3 ♀♀ ditto, 18.ii.34. 1 ♂ & 1 ♀ ditto, 23.ii.34.

Acisoma panorpoides ascalaphoides Rambur. 1 ♀ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 16.ii.34.

Hemistigma albipuncta Rambur. 1 ♂ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 16.ii.34. 2 ♂♂ Uganda, Bunyoro Dist., Budongo Forest, 17.ii.34. 1 ♂ Uganda, Toro Dist., Kibale Forest, 26.ii.34.

Crocothemis erythraea Brullé. 1 ♂ Kenya, Thika, Kianzabe Estates, 25.i.34. 1 ♀ Kenya, Meru Dist., Gunga Crater Lake, 29.i.34. 1 ♂ Belgian Congo, Katanga Prov., Elizabethville, Lubumbashi River, 4.iv.34.

Brachythemis lacustris Kirby. 1 ♀ Uganda, Busoga Dist., Jinja, Owen Falls, 10.ii.34.

Brachythemis leucosticta Burmeister, 2 ♂♂ & 2 ♀♀ Kenya, Thika, Kianzabe Estates, 25.i.34. 3 ♂♂ & 1 ♀ Belgian Congo, Lualaba (Congo) River, 31.iii.34.

Diplacodes lefebvrei Rambur. 3 ♀♀ Kenya, Meru District, Gunga Crater Lake, 29.i.34. 1 ♂ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 16.ii.34.

Helothemis dorsalis Rambur. 2 ♂♂ Belgian Congo, Katanga Prov., Elizabethville, Lubumbashi River, 4.iv.34.

Trithemis arteriosa Burmeister. 2 ♂♂ Kenya, Thika, Kianzabe Estates, 25.i.34. 1 ♂ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 18.ii.34. 1 ♂ ditto, 23.ii.34.

Trithemis annulata Pal. de Beauvois. 6 ♂♂ & 2 ♀♀ Uganda, Toro Dist., Ruwenzori Range, Ndali Crater Lakes, 27.ii.34.

Trithemis stictica Burmeister. 1 ♂ Kenya, Thika, Kianzabe Estates, 25.i.34.

Trithemis nuptialis Karsch. 4 ♂♂ Uganda, Bunyoro Prov., Budongo Forest, Nyamagita Dam, 18.ii.34.

Trithemis risi Longfield. 1 ♀ Uganda, Kigezi Dist., Birunga Mt. Plateau, Lake Mutanda, 9.iii.34. 1 ♂ Belgian Congo, Katanga Prov., Elizabethville, Lubumbashi River, 4.iv.34.

Trithemis pruinata Karsch. 1 ♂ Uganda, Bunyoro Prov., Budongo Forest, Nyamagita Dam, 23.ii.34.

Atoconeura biordinata Karsch. 1 ♂ Kenya, Meru, 6000 ft., 29.i.34.

Zygonyx torrida Kirby. 1 ♂ & 1 ♀ *in cop.* and 2 ♂♂ Southern Rhodesia, Victoria Falls, 9.iv.34.

Urothemis assignata Selys. 1 ♂ & 1 ♀ *per coll.* (laying eggs), and 1 ♂ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 16.ii.34. 1 ♂ & 1 ♀ *per coll.* (laying eggs), Uganda, Toro Dist., Kahuna, 28.ii.34.

Tholymis tillarga Fabricius. 2 ♂♂ Belgian Congo, Lualaba (Congo) River, Tshialu, 28.iii.34.

Chlorocypha caligata Selys. 1♀ Kenya, Meru Dist., Thoura Forest, 30.i.34. 1 ♂ ditto, 1.ii.34. 5 ♂♂ & 3 ♀♀ Belgian Congo, Katanga Prov., Elizabethville, Lubumbashi River, 4.iv.34.

Chlorocypha jejuna Bauman. 2 ♂♂ Belgian Congo, Katanga Prov., Elizabethville, Lubumbashi River, 4.iv.34.

Chlorocypha tenuis Longfield. 3 ♂♂ & 1 ♀ Uganda, Toro Dist., Kibale Forest, 25.ii.34. 3 ♀♀ 26.ii.34. 1 ♀ 1.iii.34. 4 ♂♂ 2.iii.34.

Phaon iridipennis Burmeister. 2 ♂♂ & 2 ♀♀ Southern Rhodesia, Victoria Falls, Rain Forest, 10.iv.34.

Mesocnemis singularis Karsch. 2 ♂♂ & 1 ♀ Uganda, Busoga Dist., Jinja,

Owen Falls, 10.ii.34. 1 ♂ & 2 ♀♀ Southern Rhodesia, Victoria Falls, Kalai Island, 7.iv.34.

Chlorocnemis pauli Longfield. 9 ♂♂ Uganda, Toro Dist., Kibale Forest, 2.iii.34.

Disparaneura simba Martin. 9 ♂♂ Belgian Congo, Katanga Prov., Elizabethville, Lubumbashi River, 4.iv.34.

Ischnura senegalensis Rambur. 6 ♂♂ & 6 ♀♀ (homo.) and 4 ♂♂ & 4 ♀♀ (het.) *in cop.* also 6 ♂♂, 4 ♀♀ (homo.), 12 ♀♀ (het.) and 1 ♀ with entire male colouring, Uganda, Kigezi Dist., Birunga Mts., Lake Bunyoni, 6500 ft., 6.iii.34.

Agriocnemis inversa Karsch. 1 ♀ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 16.ii.34. 7 ♂♂ & 4 ♀♀ ditto, 18.ii.34. 1 ♀ ditto, 23.ii.34.

Mombagrion congoense Sjöstedt. 4 ♂♂ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 16.ii.34. 1 ♂ ditto, 18.ii.34.

Pseudagrion bicoerulans Martin. 5 ♂♂ & 1 ♀ Kenya, Meru Dist., Upper Thoura Forest, 7400 ft., 31.i.34. 1 ♀ Kenya, Meru Dist., Thoura Forest, 6500 ft., 2.ii.34.

Pseudagrion kersteni Gerstaecker. 1 ♂ Kenya, Meru, 6000 ft., 28.i.34. 2 ♂♂ Kenya, Meru Dist., Thoura Forest, 6500 ft., 30.i.34. 1 ♀ Uganda, Toro Dist., Kibale Forest, 25.ii.34. 1 ♂ ditto, 2.iii.34. 3 ♂♂ Belgian Congo, Katanga Prov., Elizabethville, Lubumbashi River, 4.iv.34.

Pseudagrion gerstaeckeri Karsch. 1 ♂ & 1 ♀ *in cop.* and 4 ♂♂ & 2 ♀♀ Kenya, Meru, 6000 ft., 28.i.34. 4 ♂♂ ditto, 30.i.34. 1 ♂ Uganda, Kigezi Dist., Kabale, 5.iii.34.

Pseudagrion salisburyense Ris. 4 ♂♂ & 1 ♀ Belgian Congo, Katanga Prov., Elizabethville, Lubumbashi River, 4.iv.34.

Pseudagrion spernatum Selys. 2 ♂♂ & 2 ♀♀ Belgian Congo, Katanga Prov., Elizabethville, Lubumbashi River, 4.iv.34.

Pseudagrion angolense Selys. 1 ♂ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 18.ii.34. 1 ♂ & 1 ♀ *in cop.* and 5 ♂♂ ditto, 23.ii.34. 1 ♂ Uganda, Toro Dist., Kibale Forest, 26.ii.34. 2 ♂♂ Belgian Congo, Katanga Prov., Elizabethville, Lubumbashi River, 4.iv.34.

Pseudagrion epiphonematicum Karsch. 2 ♂♂ & 2 ♀♀ Uganda, Toro Dist., Kibale Forest, 2.iii.34.

Pseudagrion nubicum Selys. 3 ♂♂ & 3 ♀♀ *in cop.* and 8 ♂♂ Belgian Congo, Lualaba (Congo) River, Tshialu, 28.iii.34 and 31.iii.34.

Pseudagrion glaucescens Selys. 5 ♂♂ Belgian Congo, Lualaba (Congo) River, Tshialu, 28.iii.34.

Pseudagrion acaciae Förster. 3 ♀♀ Southern Rhodesia, Victoria Falls, Kalai Island, 7.iv.34.

Pseudagrion massaicum Sjöstedt. 1 ♀ Uganda, Busoga Dist., Jinja, Owen Falls, 10.ii.34. 6 ♂♂ & 6 ♀♀ *in cop.* and 6 ♂♂ Uganda, Toro Dist., Ruwenzori Range, Ndali Crater Lake, 27.ii.34. 1 ♂ Uganda, Toro Dist., Murumbanza Estate, 28.ii.34. 1 ♂ & 1 ♀ *in cop.* and 3 ♂♂ Belgian Congo, Lake Kivu, 5000 ft., 17.iii.34. 3 ♀♀ Southern Rhodesia, Victoria Falls, Kalai Island, 7.iv.34. 1 ♂ & 2 ♀♀ Southern Rhodesia, Victoria Falls, Rain Forest, 9.iv.34. 1 ♀ ditto, 10.iv.34.

Ceriagrion glabrum Burmeister. 1 ♀ Kenya, Thika, Kianzabe Estates, 25.i.34. 6 ♂♂ Kenya, Meru Dist., Gunga Crater Lake, 29.i.34. 1 ♂ & 1 ♀ *in cop.* and 1 ♂ & 1 ♀ Uganda, Bunyoro Dist., Budongo Forest, Nyamagita Dam, 16.ii.34.

Enallagma nigridorsum Selys. 1 ♂ & 1 ♀ *in cop.* and 8 ♂♂ Uganda, Toro Dist., Ruwenzori Range, Ndali Crater Lake, 27.ii.34.

Enallagma pseudelongatum Longfield. 2 ♂♂ & 2 ♀♀ *in cop.* and 5 ♂♂

Uganda, Toro Dist., Kibale Forest, 26.ii.34. 2 ♂♂ & 2 ♀♀ *in cop.* and 4 ♂♂ Uganda, Kigezi Dist., Birunga Mts., Bamboo Forest, 7500 ft., 8.iii.34.

Enallagma subfurcatum Selys. 1 ♂ Uganda, Toro Dist., Murumbanza, 28.ii.34. 1 ♂ Uganda, Kigezi Dist., Birunga Mts., Lake Bunyoni, 6500 ft., 6.iii.34.

Enallagma glaucum Burmeister. 5 ♂♂ & 4 ♀♀ Kenya, Meru, 1.ii.34.

2. Collection by W. H. T. Tams from the Guinea Gulf, Oct. 1932–Feb. 1933.

Paragomphus moka Longfield. 2 ♂♂ Fernando Po, Moka, 28.i.–3.ii.33.

Anax chloromelas Ris. 1 ♀ Spanish Guinea, Bata, 20.ii.33.

Macromia sophia Selys. 2 ♂♂ Fernando Po, Moka, 28.i.–3.ii.33.

Orthetrum stemmale capense Calvert. 1 ♂ & 1 ♀ São Thomé Island, 31.x.32. 2 ♂♂ & 1 ♀ ditto, 19.xi.32. 2 ♀♀ Principe Island, 19.xii.32. 1 ♂ & 1 ♀ Fernando Po, Moka, 28.i.–3.ii.33.

Orthetrum brachiale Pal. de Beauvois. 1 ♂ São Thomé Island, 22.xi.32.

Orthetrum africanum Selys. 1 ♂ Principe Island, 31.xii.32.

Pseudomacromia sp. 1 ♀ Annabon, 16.ii.33.

Palpopleura lucia ♂ form *lucia* Drury. 6 ♂♂ & 4 ♀♀ São Thomé Island, 22.xi.32. 3 ♂♂ Principe Island, 14.xii.32 and 1.i.33.

Crocothemis erythraea Brullé. 2 ♂♂ & 2 ♀♀ São Thomé Island, 22 & 24.xi.32.

Trithemis donaldsoni nigra Longfield. 1 ♂ Principe Island, Ogui Pipi, 7.xii.32. 1 ♂ Principe Island, 1.i.33.

Umma longistigma Selys. 2 ♀♀ Fernando Po, Mioko Mineral Spring, 1.ii.33.

Ischnura senegalensis Rambur. 3 ♂♂ & 3 ♀♀ (het.) Spanish Guinea, Bata, 20.ii.33.

Pseudagrion melanicterum Selys. 1 ♂ & 1 ♀ Fernando Po, Moka, 28.i.–3.ii.33.

3. Collection by Miss M. Steele from West Darfur, Jebel Murra, April–July, 1932.

Anax speratus Hagen. 1 ♂ & 2 ♀♀ Killing, 7000 ft., 7.v.32. 1 ♂ Kallikitting, 2.vi.32. 1 ♂ Deriba Lakes, 15–17.vi.32. 1 ♂ Kurra, 4.vii.32.

Aeshna rileyi Calvert. 1 ♂ Deriba Lakes, 7.vi.32. 1 ♂ & 1 ♀ Killing, 29.vi.32.

Zygonyx torrida Kirby. 1 ♂ Karanga, 6600 ft., 19.iv.32. 1 ♂ Kallikitting, 2.vi.32.

Orthetrum taeniolatum Schneider. 1 ♀ Karanga, 6600 ft., 18.iv.32. 2 ♂♂ & 2 ♀♀ ditto, 19.iv.32. 4 ♂♂ & 2 ♀♀ ditto, 23.iv.32. 2♀♀ Killing, 7.v.32. 1 ♀ Kirima, 20.v.32. 3 ♂♂ & 1 ♀ Karanga, 20.vi.32. 1 ♀ Kurra, 4.vii.32.

Orthetrum caffrum Burmeister. 3 ♂♂ Deriba Lakes, 8000 ft., 26.iv.32. 2 ♂♂ & 1 ♀ Dembilbil, 8300 ft., 2.v.32. 4 ♂♂ & 2 ♀♀ Killing, 7000 ft., 8.v.32. 5 ♂♂ & 4 ♀♀ Dimbiti, 28.v.32. 1 ♀ Deriba Lakes, 8000 ft., 15–17.vi.32. 1 ♂ Killing, 7000 ft., 29.vi.32.

Orthetrum farinosum Förster. 1 ♀ Kallikitting, 2.vi.32. 4 ♂♂ Kurra, 5600 ft., 4.vii.32.

Orthetrum brachiale Pal. de Beauvois. 2 ♂♂ Karanga, 6600 ft., 23.iv.32. 1 ♂ Killing, 7.v.32. 1 ♂ Kallikitting, 4450 ft., 2.vi.32. 1 ♂ Karanga, 20.vi.32.

Orthetrum abbotti Calvert. 1 ♀ Dimbiti, 7600 ft., 28.v.32. 1 ♂ & 1 ♀ Kallikitting, 2.vi.32.

Crocothemis erythraea Brullé. 1 ♂ Karanga, 6600 ft., 23.iv.32. 2 ♂♂ & 1 ♀ Killing, 7000 ft., 7.v.32. 2 ♂♂ Kirima, 20.v.32. 1 ♀ Killing, 29.vi.32.

Crocothemis sanguinolenta Rambur. 7 ♂♂ & 2 ♀♀ Karanga, 6600 ft., 19–23.iv.32. 1 ♂ Dembilbil, 8300 ft., 2.v.32. 5 ♂♂ Killing, 7000 ft., 7–8.v.32. 1 ♂ & 1 ♀ Kirima, 20.v.32. 1 ♂ & 3 ♀♀ Dimbiti, 28.v.32.

Palpopleura jucunda Rambur. 1 ♀ Killing, 7000 ft., 7.v.32. 1 ♀ ditto. 8.v.32. 1 ♀ Tokomi, 18.v.32. 1 ♂ Kirima, 20.v.32. 3 ♂♂ & 7 ♀♀ Kallikitting, 2.vi.32.

Trithemis arteriosa Burmeister. 1 ♂ Karanga, 6600 ft., 23.iv.32. 11 ♂♂ & 1 ♀ Kirima, 20.v.32. 1 ♂ & 1 ♀ Dimbiti, 28.v.32. 1 ♂ Kallikitting, 2.vi.32. 1 ♂ Kurra, 4.vii.32.

Trithemis kirbyi ardens Gerstaecker. 7 ♂♂ Kirima, 20.v.32. 2 ♂♂ Kurra, 4.vii.32.

Trithemis stictica Burmeister. 3 ♂♂ Killing, 7000 ft., 8.v.32. 1 ♀ Kurra, 4.vii.32.

Trithemis risi Longfield. 2 ♂♂ Karanga, 6600 ft., 20.iv.32. 6 ♂♂ Killing, 7000 ft., 7–8.v.32. 3 ♂♂ Kurra, 4.vii.32.

Trithemis dichroa Karsch. 2 ♂♂ Kallikitting, 4450 ft., 2.vi.32.

Pantala flavescens Fabricius. 1 ♂ & 1 ♀ Kallikitting, 2.vi.32.

Lestes ictericus Gerstaecker. 1 ♀ Deriba Lakes, 8000 ft., 26.iv.32. 2 ♂♂ & 4 ♀♀ Kirima, 5525 ft., 20.v.32. 1 ♂ Karanga, 6650 ft., 20.vi.32.

Enallagma subfurcatum Selys. 1 ♂ & 1 ♀ Dembilbil, 8300 ft., 2.v.32. 5 ♂♂ & 1 ♀ Dimbiti, 28.v.32. 1 ♂ Kallikitting, 2.vi.32.

Ischnura senegalensis Rambur. 4 ♂♂ & 1 ♀ (homo.) Deriba Lakes, 8000 ft., 26.iv.32.

Pseudagrion kersteni Gerstuecker. 1 ♀ Deriba Lakes, 8000 ft., 26.vi.32. 1 ♀ Killing, 7000 ft., 7.v.32. 3 ♂♂ Kirima, 20.v.32. 2 ♂♂ & 2 ♀♀ Dimbiti, 28.v.32. 7 ♂♂ & 16 ♀♀ Kallikitting, 2.vi.32. 3 ♂♂ & 2 ♀♀ Karanga, 20.vi.32.

4. Collection by Dr. K. Jordan from South-west Africa, Nov. 1933–Jan. 1934.

Anax mauricianus Rambur. 1 ♂ Waterberg, Otjosongombe, 6.xi.33.

Hemianax ephippiger Burmeister. 1 ♂ Waterberg, Otjosongombe, 6.xi.33. 1 ♀ Sissekab, 13.xi.33.

Orthetrum trinacria Selys. 1 ♂ Otjosongombe, 4.xi.33. 1 ♂ Otavifontein, 10.xi.33. 2 ♂♂ Sissekab, 13.xi.33.

Orthetrum brachiale Pal. de Beauvois. 3 ♂♂ Otjosongombe, 4–6.xi.33. 1 ♂ Sissekab, 13.xi.33. 4 ♂♂ & 1 ♀ Otavifontein, 10–20.xi.33.

Orthetrum stemmale capense Calvert. 1 ♂ Otjosongombe, 4.xi.33. 2 ♂♂ Sissekab, 13.xi.33.

Hemistigma albipuncta Rambur. 1 ♀ Sissekab, 13.xi.33.

Crocothemis erythraea Brullé. 4 ♂♂ Otjosongombe, 2–6.xi.33. 1 ♀ Sissekab, 13.xi.33.

Crocothemis sanguinolenta Burmeister. 2 ♂♂ & 1 ♀ Sissekab, 13.xi.33.

Sympetrum fonscolombei Selys. 1 ♂ Otavifontein, 20.xi.33.

Diplacodes lefebvrei Rambur. 1 ♂ Satansplatz, 17.xii.33.

Trithemis arteriosa Burmeister. 2 ♂♂ Otavifontein, 10–20.xi.33.

Trithemis annulata Pal. de Beauvois. 1 ♂ Otjosongombe, 2.xi.33.

Trithemis kirbyi ardens Gerstaecker. 2 ♂♂ Otavifontein, 20.xi.33. 1 ♂ west of Maltahohe, 12.xii.33.

Pantala flavescens Fabricius. 1 ♂ & 1 ♀ Otjosongombe, 6.xi.33. 4 ♂♂ & 3 ♀♀ Otavifontein, 10–21.xi.33. 6 ♂♂ & 2 ♀♀ Sissekab, 13.xi.33. 2 ♂♂ & 1 ♀ Naukluft, 7–10.xii.33. 2 ♀♀ Satansplatz, 17–18.xii.33. 2 ♂♂ & 2 ♀♀ Hoffnung, 26–28.xii.33.

Lestes ictericus Gerstaecker. 1 ♂ Satansplatz, 17.xii.33.
Enallagma glaucum Burmeister. 1 ♀ Naukluft, 7.xii.33. 1 ♂ Hoffnung, 5.i.34.
Ischnura senegalensis Rambur. 1 ♂ Naukluft, 7.xii.33.

5. Collection by Dr. K. Jordan from Angola, March–May 1934.

Anax mauricianus Rambur. 1 ♂ Congulu, —.iv.34.
Orthetrum caffrum Burmeister. 1 ♂ & 1 ♀ Mt. Moco, 15.iii.34.
Orthetrum brachiale Pal. de Beauvois. 1 ♂ west of Cubal, 29.iii.34. 1 ♂ Congulu, —.iv.34. 1 ♂ Quirimbo, —.v.34.
Palpopleura lucia ♂ form *lucia* Drury. 1 ♂ Quirimbo, —.v.34.
Palpopleura deceptor Calvert. 1 ♂ west of Cubal, 29.iii.34.
Crocothemis erythraea Brullé. 1 ♀ west of Cubal, 29.iii.34.
Trithemis arteriosa Burmeister. 1 ♂ west of Cubal, 29.iii.34.
Trithemis kirbyi ardens Gerstaecker. 4 ♂♂ west of Cubal, 29.iii.34.
Trithemis risi Longfield. 3 ♂♂ Mt. Moco, 15.iii.34. 1 ♂ Congulu, —.iv.34.
Trithemis pluvialis Förster. 1 ♂ Mt. Moco, 15.iii.34.
Philonomon luminans Karsch. 1 ♂ west of Cubal, 29.iii.34. 1 ♂ & 6 ♀♀ Quirimbo, —.v.34.
Pantala flavescens Fabricius. 1 ♀ west of Cubal, 29.iii.34. 2 ♂♂ & 7 ♀♀ Congulu, —.iv.34. 1 ♂ Quirimbo, —.v.34.
Tholymis tillarga Fabricius. 2 ♂♂ & 2 ♀♀ Quirimbo, —.v.34.
Pseudagrion salisburyense Ris. 2 ♂♂ Mt. Moco, 15.iii.34. 2 ♂♂ & 2 ♀♀ Quirimbo, —.v.34.
Pseudagrion angolense Selys. 1 ♂ Mt. Moco, 15.iii.34.

6. Collection by Mr. T. H. E. Jackson in South-west Uganda, Kalinzu Forest, Jan. 1935.

Micromacromia camerunica Karsch. 3 ♂♂.
Brachythemis leucosticta Burmeister. 1 ♂.
Orthetrum stemmale capense Calvert. 1 ♂.
Gynacantha bullata Karsch. 1 ♀.
Umma mesostigma Selys. 2 ♂♂ & 4 ♀♀.
Chlorocypha tenuis Longfield. 1 ♂ & 4 ♀♀.

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ERRATA.

p. 58, line 24 from bottom, for ALLEN *read* ALLAN.

PRINTED IN GREAT BRITAIN BY
RICHARD CLAY & SONS, LIMITED,
BUNGAY, SUFFOLK.